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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officers, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

U. S. NAVAL MEDICAL BULLETIN

VOL. XXIII

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No. 1

SPECIAL ARTICLES

SINUS INFECTIONS

By C. B. CAMMER, Lieutenant Commander, Medical Corps, United States Navy

In a consideration of the nasal accessory sinuses and the treatment of morbid conditions arising therein, a brief résumé of their development, evolution, and relative anatomy may not be amiss.

In his study of the comparative anatomy of this region, O'Malley has traced the sinuses and nasal cavities in the vertebrate group of craniata, beginning with the lamprey and progressing through the fish, amphibia, reptiles, birds, and lower mammals to man; pointing out many phases of both progression and retrogression along the lines of selective development. He finds that the nose is at first solely possessed of olfactory sense, subsequently becoming associated with taste and later with respiration. As the latter function assumes more predominance, that of olfaction tends to recede.

It is further noted that the specialized structures of the adult of one species become vestigial in the adult of a higher class, but are always reproduced in the embryonic stage of the latter.

Prior to the formation of the permanent palate in the human fetus, it passes through the various phases which are found in the above-mentioned series of vertebrates, the progressive development from the stage of water to air breathers being intimately concerned in the evolution and final formation of the mouth and nose. Three definite stages are recognized, viz:

(a) *The piscine*, wherein the mouth and nose are developed independently.

(b) *The amphibian*, wherein the respiratory nasal passage is found to open on the roof of the mouth.

(c) *The mammalian*, wherein it is found to open into the nasopharynx.

Larger turbinate area, with greater number of turbinates, is found in air-breathing mammals with greater olfactory power, although the relative distribution of olfactory and respiratory epithelium shows

the latter to predominate. The shark, for example, has no turbinates, but a highly developed sense of smell, while, on the other hand, in the amphibia the turbinates are covered with olfactory epithelium and their sense of smell is relatively very poor. The replacement of sensory by respiratory epithelium marks a step in response to functional need which the nose has undergone in its development from a purely olfactory organ to one largely of respiration.

It is considered that the sinuses exist in their present form to give both bulk and strength to the frame work of the face, combined with lightness. They are also believed to exercise an important function in man by serving as resonators to the voice, possibly with some further function as yet undetermined.

Ballenger considers them as residual olfactory organs and draws the interesting conclusion that they are gradually closed off from the nose as the need for highly developed olfaction recedes during evolution until only small openings between them and the nose are found in man. Inflammation of their lining mucosa as a result of poor ventilation becomes consequently more frequent; which would probably not be the case were the openings larger, thus affording greater drainage and aeration. It therefore follows that the first consideration in treatment is to establish both drainage and ventilation.

The nose, or nasal chamber, is divided into the right and left nostril by the nasal septum and functions normally for respiratory, olfactory, phonatory, and gustatory purposes.

Inspired air passes upward from the vestibule to the middle and superior meatus, then is deflected downward and backward by the middle turbinates and the roof of the nose to the epipharynx. Expired air is deflected from the vault of the middle and inferior meatus and the vestibule. These air routes are of considerable clinical importance, as stoppage thereof at certain locations produces definite phenomena with resultant functional impairment. The turbinates are three in number, superior, middle, and inferior, located on the outer nasal wall, only the two latter being of clinical importance. They are anatomically characterized by the presence of venous plexuses in the submucous tissue, sometimes called "swell bodies," which are structurally true erectile tissue. These plexuses are located chiefly along the inferior border and posterior extremities of the middle and inferior turbinates.

Their function is to warm inspired air to body temperature and regulate the amount of mucous secretion which tends to humidify and filter the air, a very important one, as the lower respiratory tract does not normally secrete sufficient mucous or moisture for these protective purposes. Hence the turbinal bodies must be functioning properly to help prevent bronchial and other affections of the lower

respiratory tract, thus preventing metabolic changes and the interference of proper interchanges of gases in the alveoli, etc.

The inspired air is also filtered by the vibrissae, which, in conjunction with the warm and moist mucous surfaces referred to, help to remove dust and other foreign matter. The mucous secretion of the nose and sinuses has been shown to exercise a definite bactericidal action, certain organisms being either killed or rendered inactive when subjected thereto.

The olfactory sense in man is located in the Schneiderian membrane, found only in the superior meatus, and is the area of termination of the olfactory filaments.

As noted, further functions of the nose are: Gustatory, merely complementary to the sense of taste, e. g., note lessening of taste with coryzas, etc.; phonatory, enriching the voice by overtones; and ventilation of the accessory sinuses, thus maintaining the normal resistance of the mucous membrane and preventing the rapid decomposition of secretions.

The turbinates divide the nose into three meatuses:

- (a) *Inferior*, below the inferior turbinate.
- (b) *Middle*, between the inferior and middle turbinates.
- (c) *Superior*, that space above the middle turbinate to the roof of the nose (formed by the cribriform plate).

All are of great clinical importance, as the accessory sinuses of the nose drain into them.

The inferior meatus has but one structure draining thereinto, the nasolacrimal duct, entering the meatus through the valve of Hasner.

The middle meatus is of great clinical importance, as the frontals; anterior group of ethmoidal cells, with their numerous ostiae; the agger nasi, if present; and the maxillary antrum all drain into it by way of the infundibulum. However, frequently many of the ethmoid cells drain directly into the meatus, notably the bulla ethmoidalis. Clinically, where pus is present, an open empyema of this series is found.

The superior meatus is of clinical interest, as the posterior group of ethmoidal cells and the sphenoids open thereinto. It can not be directly inspected, as it lies above the middle turbinate. When pus flows into it from one of the above sinuses it may be observed in the olfactory fissure, that space between the septum and middle turbinate. It is further clinically important as the terminus of the olfactory filaments located throughout this region.

The sinuses, *per se*, in man, being considered as residual in character, are, like the appendix, etc., possessed of but low recuperative power following disease or operative procedures. Through long ages of retrogression vitality has been partially lost and regeneration become tardy, hence the extreme liability of chronicity of any local

infection. The general nerve supply is derived from the sphenopalatine or Meckel's ganglion, anterior ethmoidals, and the nasopalatine, with association fibers communicating with the vagus nuclei.

General conditions which may possibly result from infected sinuses may be summarized as follows:

(a) *Digestive*.—May be brought about by the ingestion of infected secretions from the sinuses and nose, causing what is popularly known among the laity as "chronic dyspepsia" or "indigestion." This is more apt to be caused by putrefactive organisms than by staphylococci or streptococci. By reversing this process, atony of the stomach, hyperchlorhydria, gout, lithemia, and allied conditions may frequently produce nasopharyngeal irritation with resultant functional impairment, and by reflex irritation bring about chronic pharyngitis and rhinitis, with hypersensitiveness, sneezing, aberrant senses of smell, etc.

(b) *Anaemia* often gives rise to atrophic rhinitis and, on the other hand, the latter may cause anaemia following the absorption of toxins from the nose and sinuses with attendant loss of proper respiratory function.

(c) *Asthma* is occasionally brought about by vasomotor rhinitis with turgescence due to a disturbed nervous system. It is usually reflex in character and attributed to toxins in the blood stream.

(d) *Rheumatic fevers and arthritides* may frequently be traced to this source but, as a point of focal infection, the more common gateway will be found to be through diseased tonsils, teeth, or prostate.

(e) *Malaria*, by blood conveyance of the parasites, may produce mastoid pain (even sinus thrombosis) and nasal hydrorrhoea with vasomotor rhinitis.

(f) *Appendicitis* may be referable to nasosinus infections, a definite connection by blood and lymph channels and possibly by the alimentary canal having been observed, as in certain cases the same organism will be found in a diseased appendix as in an infected sinus and nose.

(g) *Diseases of the eye* quite frequently are associated with sinus infections, the latter being often confused with "eye strain," with requests for refraction, etc., thus missing the real cause. Bono and Frisso placed bacteria in noses, both with and without stoppage of the naso-frontal duct, subsequently finding the same organisms in both the vitreous and aqueous humors of the corresponding eyes.

(h) *Asthenopia* is frequently caused by undue pressure, usually by the middle turbinate, but more often in ethmoiditis, with resultant optic neuritis, followed in extreme cases by atrophy and blindness. A concomitant symptom is usually "brow ache" or pain referred to the occiput in rare instances, due to pressure on the motor-

sensory branches of the fifth nerve. Abscesses may form in any part of the orbital tract, producing marked protrusion of the eyeball with complicating meningitis, cerebral abscess, etc.

(i) *Headaches* due to sinus disease are of a dull, steady character, most marked when stooping, not relieved by closing or resting the eyes nor aggravated by their use, and are most pronounced upon awakening. Sluder employs the term "vacuum headaches," especially in involvement of the frontal and ethmoidal sinuses, this particular type being characterized by pain of low grade, unending type, produced by closure of the ostiae and absorption of the contained air, brought about by unfavorable anatomical settings and hyperplastic changes, both in the bone and soft parts. This class of patient does not have pus, never has the severe pain found with empyema of the sinuses, and never has complications of blindness or changes in the globe. The asthenopia is characterized by inability to use the eyes for near work and is not relieved by glasses or other eye treatment.

In considering the individual sinuses, Hajek found it convenient to group them into two series or groups, the first comprising the antrum, frontal, and anterior ethmoidal sinuses and the second the posterior ethmoidal and sphenoidal sinuses. They will be taken up in this order.

(a) **FRONTAL SINUSES.**—These sinuses are extensions upward of the anterior group of ethmoidal cells between the plates of the frontal bone. This extension occurs about the age of puberty, hence prior to that time these sinuses are normally absent. Their size and shape vary greatly, even in the same person. This is surgically important and often a determining factor in operative work, as, in the case of large, deep sinuses, removal of the anterior wall will result in marked deformity. They drain into the middle meatus through the infundibulum in about 50 per cent of cases and directly into the meatus in the remainder, by way of the naso-frontal duct.

Symptoms due to retained secretions and acute inflammation are: *Pain and tenderness increased* on pressure. This is rare over the frontal bone except in very acute cases, but is nearly always present when the pressure is made on the floor near the inner orbital angle. To be properly elicited, the examining finger should be placed well under the roof of the orbit and directly upward, backward, and inward. The X ray is of great value in arriving at a diagnosis, as occasionally some of the anterior ethmoid cells project beneath the floor of the sinus, a factor not to be lost sight of.

Redness and swelling are only encountered in severe cases, when osteomyelitis has appeared and the skin and soft parts have yielded to the process. Operation should never be delayed long enough to permit the appearance of these symptoms.

Mucus discharge has heretofore been considered of importance, but Ballenger points out that there is usually a complete stoppage, due to closure of the duct, and it may be entirely absent. A burning sensation is often complained of in the anterior portion of the nose, or fissures or excoriations at the margins of the nostrils may be caused by the irritating discharges.

The *headache* is usually limited to the affected side and is usually more severe at night than in the morning, tending to subside in intensity about noon, by which time gravity may help ameliorate symptoms by favoring drainage. This is frequently confused with eye strain. Dizziness and vertigo are nearly always present and aggravated by stooping and upon resuming an upright position.

Inflammation of the frontal (or any other sinus) may give rise to morbid processes in any of the ocular structures, due to the free anastomosis between the veins and the ophthalmic vein. Infection may readily be spread by contiguity and produce papillitis, choroiditis, optic neuritis, iritis, keratitis, etc., followed by optic atrophy and blindness in extreme cases.

Intracranial complications may be either extra-aural or brain abscesses; meningitis and sinus thrombosis may arise, the frequency of meningitis due to sinus infections merely tending to prove the better present understanding of the subject than formerly.

(b) ANTERIOR ETHMOIDAL GROUP.—The anterior group of ethmoid cells varies greatly in number and size (usually from two to eight in number) and the cells are uniformly smaller than those of the posterior group. They all drain into the middle meatus, each having its own ostium. They are, as a rule, found separated from the posterior group by a thin transverse bony partition corresponding to the line of attachment of the middle turbinate, the anterior group draining in front and below it, while the posterior group drains above and behind it. Accessory ethmoid cells are occasionally found in the middle turbinate and uncinate process, and when present drain as above and belong to the anterior group. The upper wall is a rather thin but dense plate of bone. The cribriform is not covered by the cells, but is fully exposed in the attic and, while the bony roof is not readily fractured, its numerous openings render it a possible atrium for conveyance of infection to the meninges. The outer wall is the "lamina papyracea" of the ethmoid and lachrymal bones. It is extremely thin and forms the inner wall of the orbit. Should perforation occur, orbital cellulitis with exophthalmus, extensive abscess formation, etc., may readily ensue. Symptoms of infection in this region comprise *vacuum headaches*, constant *sharp pain*, in case of empyema, referred to the corresponding parietal region and extending to the occiput, shoulder, and arm. Inspection usually reveals

marked turgescence, and the middle meatus is bathed in pus. There is *pain on pressure* over the lachrymal bone and bridge of the nose.

(c) ANTRUM OF HIGHMORE (MAXILLARY SINUS).—This sinus is situated in the superior maxillary bone and varies greatly in size, the ostium opening in the middle meatus by way of the infundibulum in the upper portion of the naso-antral wall, as far as possible above its floor, making the drainage very difficult except when an overflow is present.

The epithelial lining is of the modified columnar, ciliated type. In long-standing inflammatory processes these ciliae are destroyed and secretions are not conveyed toward the ostium, hence they are retained and increased in quantity.

The second bicuspid and the first and second molars are in close relation to the floor, sometimes projecting into the bony cavity, their roots being only covered by mucous membrane, hence a suppurative process involving any of these teeth may spread by lymphatics to the antrum. The superior wall or roof is crossed by the infraorbital nerve centrally and is sometimes injured during curettage of the sinus. Symptoms of infection are: *Pain* in the molar region, of a dull boring character; *tenderness* on pressure over the roots of the canine and bicuspid teeth; *feeling of fullness* of the affected side; and *increased pain* when the teeth of the two jaws are pressed together, radiating into the ear and mastoid region.

Transillumination is of great value in arriving at a diagnosis, three points being paramount: First, red pupillary reflex; second, "crescent of light" corresponding to the lower lid; third, sense of light when the eye is closed. In case these points are absent, infection is almost certain. The X ray is very important, although the difference between a greatly thickened membrane and the presence of an empyema is at times difficult to determine. It was formerly held that this sinus was the one most frequently infected, but Ballenger has shown the frontal and ethmoids to be more often involved, due to blocking by hyperplastic inflammatory processes, enlarged turbinates, or septal deviations.

(d) THE POSTERIOR ETHMOID GROUP—belonging to the second series, is usually larger in size than the anterior group and the cells fewer in number. Occasionally this group occupies nearly all of the ethmoid labyrinth, extending to the anterior portion of the superior meatus and drains upon the posterior half of the middle turbinate. The cells are not visible by direct examination nor are they accessible to the probe.

Symptoms of infection of this group are not so distinct as are those of infection of the anterior group. Due to their depth, *no pain on pressure* can be elicited and external tenderness is not present. *Exophthalmus*, due to a closed empyema, may occur, it also giving

rise to different forms of *strabismus* and *diplopia*, with circumscribed visual fields, especially for colors. *Post optic neuritis* due to infection of this region is likewise encountered. All the foregoing complications are relatively rare in proportion to the actual number of infections observed. Any undue amount of secretion in the posterior portion of the olfactory fissure which quickly reforms after having been wiped away is significant of post-ethmoidal involvement, although the pus may really come from the sphenoid, as both are so closely associated that in case one is diseased, the other is almost inevitably also affected.

(e) THE SPHENOIDAL SINUSES.—The *ostium sphenoidale* is situated in the anterior wall of the sinus near the top of the cavity, close to the nasal septum, and is hidden from the observer's view by the close approximation of the middle turbinate to the latter. Normally it can not be seen by direct rhinoscopy. The body of the sphenoid bone is usually hollowed out by this sinus. Anatomically it is of importance due to its close relationship to the optic, oculomotor, trochlear, trigeminal, and abducens nerves, the pterygoid canal with the vidian nerve, and the sphenopalatine ganglion. The point of least resistance is in the upper wall or roof, which is in close relationship to the optic nerve, hence the frequency of ocular disturbances found in closed empyemas of this area. This sinus, as pointed out by Lovell, is really the most accessible of all, once the middle turbinate is removed, the opening being directly in front of the observer, and readily accessible to probing, etc. Purulent secretions from the ostium either drain directly through the choanae into the epipharynx or on the end of the middle turbinate.

Symptoms most prominently noted are *pain* and *headache*, usually felt in the occipital region of the affected side, although it may be diffuse and ill defined. *Ocular symptoms* are dependent upon the amount of pressure brought to bear upon the optic and oculomotor nerves. As the optic nerve passes over its roof, in abscess formation, even complete *destruction of the nerve* may take place, or *neuritis* be followed by atrophy and blindness. This neuritis may be of toxic origin, even when there is no retention of secretion. Should the pressure reach the sphenoidal fissure, *strabismus*, due to motor nerve involvements, may occur. *Intense neuralgias* may follow neuritis of the third trigeminal branch. *Choroditis*, *transitory amblyopia* and *meningitis* may develop with their attendant train of symptoms. Pain may be referred to the scapular and cervical regions. Transillumination is obviously valueless, but the X ray is of paramount importance. Pain of a boring character on the top of the head is a usual symptom, but sight should not be lost of the fact that many other cases of headache result from conditions not traceable to sinus disease.

In the diagnosis of any sinus infection radiographic examination in the hands of a skilled technician is of great value in interpreting the extent and location of the process, and such routine examinations should be made wherever possible, following a thorough physical examination, the latter helping to exclude the large number of conditions simulating true sinus disease, such as refractive errors, carious and abscessed teeth, neuralgias, headaches, etc. Thanks to the improvements in radiographic technique, it is greatly to be preferred over transillumination, and the latter, while of diagnostic worth, should not be relied upon too greatly. While of certain value in pointing out antral disease, it is worthless as a definite guide in diseases of the frontal sinus.

The subject of treatment can only be generally considered within the limits of this article, but the key will be found in a previously mentioned statement, namely, "ventilation and drainage." In the great majority of cases, assuming the condition has not progressed to extremes, treatment should be along conservative lines. Mild astringents, oil applications, and argyrol favor both ventilation and drainage. Mixed vaccines are of questionable value, but may act miraculously in certain cases. Diseased tonsils and adenoids should be removed.

In general, astringents combined with negative pressure, the free use of argyrol, and, in the case of the antrum, puncture and irrigation with normal saline in addition to the above, will be found of great value. Negative pressure assists nature by reestablishing circulation to the diseased parts, thus tending to arrest the offending organism. Should it become necessary to remove the middle turbinates, enlarge the openings of the various sinuses, or employ other operative means, negative pressure should be employed as soon as possible thereafter without causing hemorrhage, but before cicatrization is well advanced, thus in many instances rapidly clearing away any pus that may persist, also to a great extent avoiding annoying crust formation.

Into a discussion of the many operations employed in the radical treatment of sinus infections the writer does not intend to go, except to state that they should not be indiscriminately used until failure to obtain definite relief by more conservative measures has been proved. Drainage and its maintenance is of paramount importance, localization of the process being rendered possible thereby.

The present trend of treatment is along conservative lines and all surgical approach to the nose and sinuses should take into consideration the important physiological functions of the nasal mucosa. McGinnis draws attention to the fact that removal of any considerable portion thereof upsets its function, and this "upsetting" is in part the reason for dissatisfaction seen in so many of our operated cases.

Ballenger well sums up the general subject of treatment, when he makes a strong plea for "rationalism as opposed to radicalism," disclaiming the latter until conservative methods have failed. In his opinion, "the true conservative is a rationalist who dares to refrain from radical procedures, and yet dares to undertake them when indicated."

TUBERCULOSIS OF THE SEMINAL TRACT

WITH REPORT OF CASES

By E. M. HARRIS, Jr., Lieutenant (Junior Grade), Medical Corps, United States Navy

While there is still some doubt as to the primary focus of seminal tuberculosis, most authorities agree that the epididymis is first affected. Secondary to the epididymis, the seminal vesicles and prostate are involved, while less constantly the bladder and testicles are attacked. The vas deferens becomes involved sooner or later in most cases.

It is characteristic of the disease that the opposite epididymis is involved in over one-half the cases in one or two years following infection of the first side. Thus it was early realized that, in order to prevent bilateral involvement and further extension of the disease, epididymectomy should be performed with partial vasectomy where indicated. Careful observations made by the foremost investigators of this disease have proved conclusively that early epididymectomy tends to render quiescent active foci present in the seminal vesicles, prostate, and other structures of the seminal tract, and a clinical cure is established in the greater percentage of cases.

In the majority of cases showing tuberculosis of the seminal tract tuberculous lesions of other organs can be demonstrated. The lung is the organ in which an associated lesion can be most frequently demonstrated, while lesions in the bones and kidneys are quite common. Quoting statistics compiled at Massachusetts General Hospital, 154 cases of tuberculosis of the epididymis showed other organs than those of the genitourinary tract involved in 55.8 per cent. The lung was the organ most frequently involved—22.7 per cent of the cases. Simmonds reported lung infection in 27 out of 35 cases of genitourinary tuberculosis. Steinthal and Keys made similar reports. It is, therefore, generally accepted that tuberculous infections of the seminal tract develop secondarily to the more extensive lesions occurring in other organs. The mode of extension of the infection to the epididymis is very likely hematogenous, while extension from the epididymis to the other structures of the seminal tract is through the lymphatics. Some investigators believe that the testicle, epididymis, and seminal vesicles have an excretory function not unlike

that of the kidneys and in this way account for the extension of the disease. It is generally accepted to-day that early conservative surgery is the most beneficial treatment available for these patients. A group of five cases presenting tuberculosis of the seminal tract is reported herewith. These cases were treated in this hospital during the past year and serve as illustrative examples of the present-day views regarding this disease.

Case I.—J. F. S., a white male, aged 33 years, admitted to the hospital November 7, 1923, with active pulmonary tuberculosis. Further examination revealed a swollen, indurated left vas and epididymis. Cystoscopy revealed tuberculous ulcers of the bladder. Ureteral catheterization showed the kidneys apparently equal in function and no evidence of tuberculous involvement. Left epididymectomy and partial vasectomy performed. Patient made an uneventful postoperative recovery and was discharged from the hospital having gained weight and strength. Examination six months after discharge from the hospital showed activity of the disease in the chest apparently arrested, and patient had gained 20 pounds in weight. His general condition showed marked improvement.

Case II.—W. D., white, male, aged 28 years, admitted to the hospital November 12, 1923, with a diagnosis of tuberculosis, chronic pulmonary, active. History of left orchidectomy in 1918. Examination corroborated the history and revealed a tuberculous right epididymis, globus major and globus minor, with a discharging sinus. The prostate was hard, nodular, and evidently tuberculous. Cystoscopy revealed several tuberculous ulcers of the bladder, while the pyelogram and plain X-ray plates showed calcareous material in both kidneys which was evidently of a tuberculous origin. One examination of the urine showed tubercle bacilli, although guinea-pig inoculation failed to show signs of infection. This case was evidently a far-advanced case of tuberculosis, with involvement of the lungs, right epididymis, and prostate. Operation was not deemed advisable, and the patient was discharged with recommendation for general sanitarium treatment.

Case III.—F. B. F., white, male, aged 26 years, admitted to the hospital April 1, 1924, complaining of a purulent discharge from a sinus in the posterior wall, left side of scrotum, and loss of weight. The patient stated that while in the Army in France he fell, striking the left testicle. He was treated in hospital seven days, and all signs of the injury disappeared. Since that time at intervals of about two months he has experienced painful enlargement of the left testicle, accompanied by fever and sweats. These symptoms would subside after a few days. During one of these attacks the

left testicle ruptured, discharging about an ounce of purulent material. Examination of the chest showed signs of an active pulmonary lesion of the right apex. Examination of the external genitalia showed left testicle three times the normal size, filling the entire left side of the scrotum, and quite firm. The left cord and epididymis were enlarged and harder than normal. On the posterior wall of the scrotum was a small opening, which was discharging a purulent material. On the right side the globus major and globus minor were enlarged. The epididymis was nodular. Cystoscopy showed tuberculous ulcers in the bladder in the region of the trigone. Ureteral catheterization showed no evidence of kidney involvement: On May 6, 1924, left epididymectomy, partial vasectomy, and partial orchidectomy were performed. A second operation was performed on June 4, 1924, in which the right epididymis and part of the vas were resected. The immediate postoperative condition was favorable for an uneventful recovery, but three weeks following the second operation the left testicle showed signs of breaking down and orchidectomy was performed on July 11, 1924. The pathological report showed tuberculous lesions of the left testicle and epididymis. On August 18, 1924, the patient was discharged from the hospital having gained in weight and his general condition was much improved.

Case IV.—N. E., white, male, aged 30 years, admitted to the hospital with the diagnosis of tuberculosis, chronic pulmonary, active. The above diagnosis was first established in February, 1922, at which time the genitourinary tract was believed to be involved. Examination confirmed chest involvement. A hard mass was found involving the right epididymis and globus minor. The right testicle was also enlarged and firmer than normal. A sinus which was discharging pus was present on the right posterior surface of the scrotum. Cystoscopy showed no tuberculous ulcers in the bladder and ureteral catheterization failed to show evidence of kidney involvement. The prostate was not involved. Operation was performed July 1, 1924. The right testicle was found to be extensively involved and was removed along with the epididymis and vas. Pathological examination confirmed the diagnosis. Patient made an uneventful postoperative recovery, and upon discharge from the hospital July 28, 1924, had gained 10 pounds, with marked improvement of general condition.

Case V.—B, white, male, aged 35 years, admitted to the hospital August 8, 1924, with a diagnosis of orchitis, traumatic. Patient had a history of active pulmonary tuberculosis in 1919 when the bacilli were found in the sputum. Left orchidectomy was performed in 1922. Examination of the chest showed signs of tuberculosis far advanced. The right testicle, epididymis and vas formed a mass

about the size of a billiard ball. The vas was about the size of a lead pencil and was indurated. The prostate was hard and indurated on the right side with the right seminal vesicle also involved. Patient complained of pain in the region of the kidneys that radiated down into the scrotum. Due to the extensive tuberculous involvement present in this case operation was not deemed practicable and patient was discharged from the hospital and recommended for care in a sanitarium.

DISCUSSION

This series of cases, presenting tuberculosis of the seminal tract, while limited to a small number, illustrates quite clearly many of the outstanding characteristics of this disease. Furthermore, we find that the subjective and objective symptoms presented are quite in accord with those brought out in the more extensive case reports of the most prominent investigators of this disease. The results from operations also coincide favorably with the results reported in larger series of cases.

A brief survey of the cases above reported show as the most outstanding features: Associated tuberculosis of the lungs and kidneys; swelling and induration of the epididymis and vas, either unilateral or bilateral; prostatic involvement; tuberculous ulcers of the bladder; scrotal sinus; and involvement of the testicle. There was history of previous trauma in one case. In two cases orchidectomy had been performed but had failed to check the progress of the disease which was too far advanced when the patients were admitted to this hospital to be benefited by operation.

DIAGNOSIS

The diagnosis of tuberculosis of the epididymis is well summed up in the following paragraph quoted from Cabot: "Induration, enlargement, and nodularity of the organ, especially at its lower pole, associated with little or no pain or tenderness, is the usual clinical picture. If in addition one finds the corresponding vas deferens enlarged and irregularly thickened, especially at its epididymal end, and if the prostate and seminal vesicles (particularly on the same side as the diseased epididymis) are likewise affected, the case is undoubtedly one of tuberculosis." Scrotal fistula is one of the most constant signs of this disease. One authority in a report of 106 cases found scrotal fistula present in 77.3 per cent. It is furthermore an early sign. The above-mentioned authority states that over 50 per cent of the patients reported this development of fistulæ within the first six months of the disease. The onset is insidious except in occasional acute cases and the exact date is there-

fore always doubtful. However, most patients report for treatment within six months to one year after first noticing symptoms of the disease. The slow development of this disease differentiates it clearly from the inflammation of the seminal tract due to gonococcus or other pyogenic infection. This type of inflammation is quite sudden in onset and there is usually history of some slight trauma preceding the attack. Pain in tuberculous infections is not a constant symptom and is frequently intermittent and mild. The disease is most frequent in young males, but has been observed in infants and the aged. Haziness of the urine associated with tenesmus and burning urination are symptoms frequently complained of and the tubercle bacilli are occasionally demonstrated in the urine. Pathological changes are chiefly the tendency to chronicity, sinus formation, and replacement of normal by fibrous tissue.

TREATMENT

The keynote to successful treatment of this disease is early diagnosis and conservative surgery combined with tuberculin and general hygienic care. Epididymovasectomy should be performed not under ether but under local novocain anesthesia or gas-oxygen. Reports from the Massachusetts General Hospital where such anesthesia is used are very satisfactory and operative mortality and post-operative complications have been greatly reduced. The operation recommended is the resection of the epididymis and accessible portion of the vas together with the tunica vaginalis and other tuberculous tissues of the scrotum. The testicle may be freely explored and the diseased portions curetted or removed with the knife. One eminent authority advocates a radical operation with the removal of the entire seminal tract when the existence of a tuberculous focus is established. This procedure is not considered practicable, however, because of the inaccessibility of the seminal vesicles which are exposed only with the aid of specially constructed guides and retractors and a carefully developed technique too difficult for the average operator, and because the results obtained by the treatment outlined above, especially in the earlier cases, have proved equally as satisfactory as the results following radical operation.

CONCLUSION

Tuberculosis of the seminal tract is a fairly common disease. Its onset is very insidious. Careful routine physical examination should enable the physician to detect the early signs of the disease. It should be sought for when tuberculous foci are found present in other organs, especially if the patient gives a history of dysuria or other suggestive symptoms. The diagnosis should be established

as early as possible and conservative operative procedure instituted under local novocain anesthesia or gas-oxygen. This, combined with tuberculin and general hygienic care, has proved of great benefit to the patients.

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EPILEPSY AS A PROTEIN SENSITIZATION DISEASE

By L. H. RODDIS, Lieutenant Commander, Medical Corps, United States Navy

Poisoning by certain forms of protein to which the organism for various reasons is unduly sensitive, has come to be a well-recognized source of illness, and a number of diseases have been set apart as due to this cause. Of these hay fever and urticaria are the best known, the former due to air-borne proteins affecting the mucous membrane, though usually not in sufficient amounts to produce constitutional effects, while in the latter there is a definite constitutional reaction. To these reactions the term anaphylaxis is applied. Following each attack there is a period of partial though transitory immunity, or period of desensitization which is called antianaphylaxis. In addition to the two diseases mentioned it has been definitely established that asthma and eczema have sensitization to protein as a factor of importance in their etiology, and recently a number of observers have pointed out the strong possibility that migraine and angioneurotic edema will be added to the list. The present article is written to draw attention to classical or idiopathic epilepsy as also a likely candidate for admission to the group.

Before introducing the evidence as to epilepsy it is necessary to review briefly the facts about protein sensitization. It is well established that persons are often sensitive to the proteins of a particular food such as wheat flour, milk, or jelly of a certain flavor. Also a more minute examination of the food in question shows that the susceptibility is to proteins in a certain part of the food, such as those in the pericarp of wheat or to those in the seed or skin of a fruit. Then, while the proteins themselves may be harmless, the products of their digestion and metabolism may be toxic. Also a certain dosage of the offending protein is needed to produce illness and the dosage may vary greatly. This latter phenomenon is probably due to factors which increase or lessen the tolerance to the toxin; fatigue, anxiety, and illness, particularly gastro-intestinal conditions, being the ones of most importance.

The symptoms which occur as the result of anaphylaxis to foreign proteins are numerous and varied. When it is recalled that syndromes as divergent as those of asthma and eczema have the same etiologic basis, it is seen under what widely differing forms the symptoms of protein anaphylaxis may appear. There are, however, some general signs and symptoms which are fairly constantly present whenever the effect is more than local in character. These are as follows:

- (1) Tendency to recur at regular or irregular intervals.
- (2) Headache, usually unilateral, often centered about one eye and orbit or one side of the occiput.
- (3) Mental dullness, drowsiness and lethargy which may extend to coma or convulsions.
- (4) Hypotension.
- (5) Subnormal temperature.
- (6) Disturbances of sensation, which precede and herald the attack as does the aura of epilepsy.
- (7) Exhaustion and lethargy during the period of recovery.
- (8) Eosinophilia, immediately preceding and during attacks.
- (9) The disturbance follows the ingestion of the exciting protein in the case of foods, while contact of the respiratory mucous membrane with air borne proteins is necessary in the hay fever group.
- (10) Attacks are precipitated and increased in frequency and severity by fatigue, fright, worry, and various strains thrown upon the organism.
- (11) There is often improvement after severe infections, pregnancy, and marked attacks of the anaphylaxis itself, apparently due either to a temporary desensitization to the irritating protein, or to a change of food habits consequent to a change in age and environment. In some instances a change in the work or mode of life may have resulted in lessened biologic strain on the organism and consequent improvement in regard to incidence and severity of attacks.

The picture presented by protein anaphylaxis has about it many features which are also common to classical epilepsy. The recurring character; the disturbances of sensation, many of which are similar to the premonitory aura of epilepsy; the tendency for biologic strain to precipitate the attacks; the mental state in the attacks which is often a counterpart of that seen in *petit mal*; hypotension and subnormal temperature following the attack; the improvement often noted after infections, pregnancy, and considerable change in age and environment are points of similarity which tend to arouse suspicion. There is some evidence to show that eosinophilia is present immediately preceding and during the epileptic convulsion though

more extended research is necessary before this can be considered proved. Further investigation is also needed as to eosinophilia in asthma, eczema, and urticaria. The tendency of toxic substances to produce convulsive seizures is well known, the poison if in sufficient amount acting as an irritant to the brain cells and producing an aberrant and uncontrolled activity of the cell. This is the case in uremia for example. With elimination of the toxin the cell, after recovering from the temporary exhaustion induced, resumes its normal activities. If the poisoning is sufficiently severe or long continued it is likely that permanent injury to the cell results. In the complexity of the protein molecule, the fact that proteins are probably absorbed as amino acids, and that a slight variation in the splitting of the molecule before absorption or the rebuilding after absorption might readily occur, we have abundant opportunity for the production of protein products unsuited to the uses of the organism and capable of producing poisonous effects.

In addition to these points so suggestive of an allergic origin for epilepsy is the totally inadequate and unsatisfactory idea of the etiology of this disease existing at present. The various neurogenic theories to account for the epileptic symptoms require a serious strain on the imagination to accept them while a review of the evidence indicating a physical basis shows how great is the possibility that epilepsy is an allergic reaction.

The ideas of treatment of classical epilepsy in vogue at present are directed solely to lessening the irritability of the nervous system with the object of making the point at which a toxin will produce visible effects higher. Research along the line of an allergic origin gives promise of a new departure in treatment and offers great possibilities for the application of therapeutic tests to clinical cases. Study of the food history in relation to the attacks, and experimental removal of foods under suspicion give hope of finding an offending protein and achieving some really permanent results. Specific and nonspecific desensitization methods are yet to be fully developed and these also open new paths toward a curative treatment.

An open mind is needed in approaching the problem from this angle. There is always a tendency to view any new conception as visionary, but little can be accomplished unless the study of a new subject is made in an impartial manner. Another serious difficulty is the lack of knowledge on the part of many medical men regarding recent studies in dietetics and nutrition and their consequent inability to secure a food history which is of real value from the patient. When it is recalled that patients are frequently susceptible to substances in the skin and seeds of fruits or vegetables, or the husks of grain, it is seen how minute the history-taking must

be as regards the food habits. Negative skin tests do not necessarily disprove susceptibility, for the reason that the extract of the whole fruit or grain may not have been used. Then the patient may be susceptible to the combination of several foods or to their putrefactive or metabolic products. Finally, the diagnosis of idiopathic epilepsy must be above suspicion, and hysteria or the many epileptiform conditions often diagnosed as epilepsy must be excluded. Thus it is seen that the difficulties of obtaining the correct solution of the problem are not few; nevertheless they are by no means unsurmountable. The purpose of this paper will be fulfilled if research is stimulated along the lines pointed out; with the result that the treatment of epilepsy, now practically at a standstill, moves forward toward a solution which if it should be a correct one, will offer some hope of definite cure for what is now too often considered a hopelessly incurable condition.

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WHAT IS A NORMAL HEART? THE POINT OF VIEW OF A MEDICAL EXAMINER

By F. K. SOUKUP, Lieutenant (Junior Grade), Medical Corps, United States Navy

Tell a man that the earth changes its rate of speed while revolving in its orbit—speeds up when nearest the sun and slows down when furthest away—he will accept the statement stoically; not a ripple on the serene waters of his mind. Tell him that his heart changes its rate of speed with every breath—speeds up during inspiration and slows down during expiration—his equanimity is gone; the storm which disturbs his mind so shakes his confidence that he lives in disquietude the balance of his life. Every thought which reminds him of a heart stirs up unpleasant apprehensions.

Mention the fact that you have observed premature contractions while examining a heart, and the victim begins to speculate when he

is "going West." Let a man have an attack of tachycardia and he is certain his days are numbered. Take his blood pressure, and if it does not happen to be 100 plus his age, with a shudder he recalls the warning, "From the fig tree learn a parable: When the branch thereof is tender, and the leaves come forth, know ye that summer is nigh." The man who started that superstition of 100 plus the age certainly accomplished his purpose, if to torture his fellowmen was his object.

If the examiner says nothing about a condition which he regards as physiological, the examinee, who may be conscious of irregularities, reasons thus: "The doctor does not know the significance," and continues to worry. If not told about the existence of irregularities he is certain to fall into the hands of some alarmist who will make his life miserable. What should be done?

Explain the reasons—why there are variations, why irregularities are considered physiological in many cases.

The medical man who has not come in contact with cases such as these in normal men will be of the opinion that the problem is overstated, that there is no such mental apprehension.

The writer has seen numerous men of this type. It has been his experience that, after hospital corpsmen get to know him well enough to trust him with their confidences and misgivings, without risk of ridicule of childish fears, many seek an opinion as to the status of their heart. Having had an explanation and their fears routed, life takes on a new meaning. Naturally sympathetic toward other "heart cases," they have, at a former station, ferreted out every victim of "heart trouble" among the personnel. With more or less persuasion and encouragement they have brought such before the medical officer.

Often it was with much personal inconvenience that the writer examined such cases, talked things over with them. But, realizing with what trepidation they approached him, seeing the change in outlook on life, change in their attitude toward their work later, he decided it was worth while.

During an annual physical examination many an officer wonders about certain peculiarities of his heart. He feels that to voice the questions which naturally arise in his mind would affect the opinion which the members of the board have of him. He says nothing. He will not admit any concern he may have regarding his health, because he believes it is not manly to do so.

But tell him what you found, explain that it does not mean disease, and you have taken a great load from his mind. He may say nothing, but his gratitude is beyond words.

What do some of these phenomena mean? Why, for example, sinus arrhythmia? Why not?

The heart and lungs have at least one function in common: To convey oxygen to the tissues. When the lungs fill up with air rich in oxygen why shouldn't the heart "make hay while the sun shines." speed up, run more blood through the lung tissue and load the oxygen into the hemoglobin cars? As the oxygen becomes more and more depleted in the lungs it would be poor economy to continue running in an excess of empty hemoglobin cars. What more natural but that the heart should slow down as the air (of low oxygen content) is expelled out of the lungs?

It is we who have no such delicate control of the heart that are abnormal, rather than those who have such control.

The heart and lungs having a common function, one would expect them to be controlled by the same or adjacent nerves. As a matter of fact, such is the case, and in this instance it is the vagus nerve. As the air distends the alveoli of the lungs, the afferent filaments of the vagus in the lungs are stimulated, the impulse reaches the neurone in the dorsal nucleus of the vagus in the medulla oblongata, and the excitation spreads in the vicinity of that neurone. If the neurone, which is connected with the heart, is very close, it is affected by the excitation, so stimulated. But the job of the vagus fibers which enter the heart is to slow the heart; therefore the stimulation slows the heart.

Since the greatest distention of alveoli occurs at end of inspiration, the slowing of the heart occurs during the following expiration—a beautiful mechanism. If the distance between the lung neurone or neurones and the cardiac ones is just a little too great, the stimulation fails to reach the cardiac neurones, and our cardio-respiratory mechanism is defective in spite of the fact that we call it "normal."

In other words, the cardiac stations can not tune in on the pulmonary ones because the latter are out of range.

How about premature contraction? A premature contraction is not a source of death. What does it mean? Why does it occur?

The heart beat normally originates in the sinus node, but if for any reason the sinus node is temporarily or permanently out of commission death does not occur, because nature has provided subordinates who can and do take over the captain's duties and run the heart. The auricle can originate the heart beat; the auriculo-ventricular node also can; even the ventricle can do so.

If one of these subordinates becomes irritated or drunk with bacterial poisons, alcohol, or nicotine, he originates a heart beat at an improper time. The heart responds and while still in the execution of the order, or just after completing its response, the captain's order reaches it, but the heart can not respond until its refractory period is over; it ignores the order and waits for the next order

from the captain. This so-called compensatory pause appears to be a "dropped beat."

Very rarely one sees an individual who apparently has a premature contraction at the end of each inspiration. However, these are not compensatory pauses that one notices, but merely due to the vagus nerve holding the sinus node in abeyance because of an unusually strong stimulation of the cardiac neurone of the vagus. The pulmonary and cardiac neurones of the vagus in the medulla oblongata in such individuals are very close together, closer than in those with sinus arrhythmia.

If the irritability of other parts of the heart is great—just a little less than that of the sinus node—then, whenever the vagus nerve slows the pace of the sinus node, some other part of the heart originates a beat. This is one source of premature contractions. The vagus can also be stimulated in the stomach and intestines—consequently premature contractions occur in digestive disturbances. Premature contractions are common in pregnancy. Such do not mean disease.

There are premature contractions which are of serious significance: Those that occur in high-blood pressure cases indicate a tired heart; those that occur in patients suffering from myocarditis, or other organic heart diseases, are not to be considered too lightly. Their origin can be determined electrocardiographically. Those which arise in the ventricle are serious, and more so if very frequent.

Another condition which is a source of much worry is a tachycardia which comes and goes without apparent cause. Some individuals particularly are subject to this phenomenon. The more attention they pay to it the worse it is.

At birth the vagus nerve has practically no control over the heart. As the child grows older his vagus nerve gets more and more control over the heart and slows it (from 140 at birth to 72 in adult life). Any mental disturbance either inhibits the action of the vagus or stimulates the accelerator nerves. In either case the heart beats rapidly. The action may be indirect through liberation of endocrine products. At any rate all humans can and do experience such rapid heart action—before examinations, before meeting important personages, etc. But in most of us the inhibition of the vagus is but momentary. In some the hold of the vagus nerve on the heart never reaches the point of full control, and these are subject to irregularities. So is the dog, and yet no dog was ever known to limit his exercise for that reason. We simply say "cardiac irregularity is normal in the dog," and that settles it. This explanation while meant seriously usually leads to some such comment as: "So you think I'd make a pretty good dog?"

Having offered a reasonable explanation and humored the examinee, he is convinced that his irregularity is not serious. And that conviction removes worry and adds years to his life.

In the annual physical examination one sees officers who run an unusually rapid pulse—entirely psychic in origin. It invariably drops in rate after exercise. Especially if the individual is conscious of something amiss he subconsciously dreads the verdict. Fortunately he usually exaggerates some physiological irregularity and there is no pathology. Take his blood pressure. It may be 180 systolic, 90 diastolic. His heart has pumped much of the blood, which he usually carries in his venous and capillary systems into his arterial system. In spite of it his blood vessels are so elastic that the pressure against which his heart must work is only 90 mm. of mercury. His heart is functionally a very good one—how otherwise in the absence of arterio-sclerosis could it in one systole raise the pressure to 180? And if the arteries were not perfectly elastic how could that pressure fall to 90 during the succeeding diastole? These phenomena are observed while the heart rate is 132 per minute—systole and diastole are unusually short. It requires good heart and arteries to adapt themselves to the mechanical requirements which vary so much and so rapidly.

How about that myth of "Normal blood pressure is 100 plus the age"? Does a mouse have to maintain the same blood pressure as the elephant to keep its blood circulating? Why then should a man weighing 100 pounds maintain the same blood pressure as one weighing 250 pounds? Their needs differ. Is not hydrodynamics to be considered at all?

It may be objected that the higher pressure in the heavier individual subjects his cerebral vessels to more tension and that there is more danger of rupture of a cerebral vessel. Yes; if his pressure were exerted within the vessels of the 100-pound individual. If the elephant's blood pressure were exerted within the blood vessels of a mouse, the latter would speedily burst—and yet regard the gentle elephant—he just lives and lives, as long as he pleases.

Within the same individual the bodily needs differ at different times, differ before and after a meal, differ with his activities, etc. It would be a sadly deficient circulatory system which could not adapt its work to the varying needs of the body. If the blood pressure did not differ, then something would be radically wrong.

If the 250-pound individual did not eat so much he would not be overweight, his blood pressure would be lower, he would have a longer life to look forward to, he would not be likely to develop diabetes. Such are the dogmatic statements one hears. True, all the income is through the mouth. But the rest of the dogma is based on a fallacy or two. Let him who propounds such dogmas restrict a

young elephant to the size of a calf and grow a pup to the same size, on exactly equal diets. "It can't be done," he says. So there is something to heredity? There is a difference in metabolism? There is a difference in absorption of food?

The same applies within the human family. There are individuals with large bony frames, other with very delicate bony frames, the muscles moving these frames must be suited for them in size and power, the energy consumption to move a heavy frame ought to be greater than that necessary to move a lighter frame. Blood pressure is a function of the weight and physiological needs of the individual can not be interpreted correctly by merely dealing with it in millimeters of mercury.

CLINICAL NOTES

LEPROSY AT THE UNITED STATES NAVAL HOSPITAL, GREAT LAKES, ILLINOIS—REPORT OF A CASE

By P. RICHMOND, Jr., Lieutenant Commander, Medical Corps, United States Navy

A Veterans' Bureau patient (H. E. B.) entered the hospital January 3, 1925, with "Diagnosis undetermined, for observation as to neuropsychiatric condition."

The patient was born in Cincinnati, Ohio, on September 7, 1878, and lived in that city until he enlisted in the Army on July 21, 1895. There is no history of leprosy among his relatives or acquaintances there. After leaving school at the age of 13 he did odd jobs, factory work, and finally learned the baker's trade before entering the Army.

From date of enlistment he served until September, 1898, when he was discharged on account of dysentery contracted in China. Patient states that he also suffered from malaria and yellow fever while in Cuba. He returned to the service in November, 1898, and was sent to the Philippines. Shortly afterwards he deserted and returned to the United States, to reenlist in February, 1901, under an assumed name and again deserted in March, 1901. For the next seven years he remained out of the service, living on the Pacific coast and working as cook in several cities. During this period he was a sailor in the merchant service one year. He remained well all this time. Patient again reenlisted in February, 1907, and again went to the Philippines, where he remained until August, 1918, except for a period of two years (January, 1912, to April, 1914), when he was on duty in China.

On April 17, 1909, he married a native Filipina. He lived with her in Manila until 1918, except for the time he was in China. In 1918 he went to Siberia and remained a year. On his return from Siberia in October, 1919, he again lived with his wife in Manila until her death on November 20, 1920. Patient states that his wife had no evidence of leprosy at any time. He describes her illness as a typical cardiac decompensation. She was examined by Army medical officers. There were no children. Patient admits extra-marital sexual relations while in China and Siberia but denies venereal disease.

Patient denies all contact with lepers, although he claims to be familiar with the manifestations of the disease, stating that he has seen many cases on the streets and elsewhere in the Orient. He states that a woman who lived across the street in Manila was taken to a leper colony in 1915 but that he knew her only casually. None of his wife's relatives or friends were so afflicted to his knowledge.

During the early part of his Army career he was in the Hospital Corps, but after the first enlistment he did duty as a cook. Except for intermittent diarrhea he claims to have remained well until 1921 when pain in the left arm developed, especially when the arm became cold. The pain is described as stinging and continuous. It was variously diagnosed and treated as neuritis, rheumatism, and tuberculosis of the bone. Later, pains in the other arm and legs developed but subsided in three months. Pain in left arm has continued until recently. In January, 1922, patient developed influenza. Following influenza, nervousness developed, accompanied by dizziness, cramps in legs, and an aggravation of the diarrhea. Symptoms continued until March, 1924, when he was confined in a closed ward at the Letterman General Hospital for some mental disorder of which he is unable to give any account. On July 17, 1924, he was discharged from the Letterman General Hospital with an S. C. D. for "pre-senile mental deterioration." Since then he has remained at home without working. He states that in October, 1924, he took a proprietary preparation (dioxal) for his diarrhea. Two weeks later a rash broke out on his forehead, neck, and left arm. This rash was not accompanied by fever, malaise, headache, or itching and has continued ever since. It was diagnosed as hives by a physician. Later he was seen by a Veterans' Bureau physician who describes the skin manifestations as follows: "At the bend of the left elbow there is some sclerosis in the venous system. The examiner has seen similar thickening of these walls following intravenous injection."

Physical examination showed the patient to be of poor nutrition and poor muscular development; height 63½ inches; weight 125 pounds; color sallow; eyes presbyopic; all teeth out; heart and lungs normal; abdomen normal; mild chronic posterior urethritis; slight, symmetrical, benign prostatic hypertrophy; external hemorrhoids.

Small discreet papular lesions on face and neck, and skin lesions on left arm and forearm. Raised reddened area 1 inch by 2 inches on posterior surface of arm near elbow. Tissue soft and elastic in this area. Crescentic area of reddened and inflammatory tissue, 4 inches wide, on flexor side of left forearm resembling tertiary syphilitic lesion. Two soft, red, inflammatory masses on posterior surface of left arm imbedded in subcutaneous tissue and resembling venous thrombosis, with local abscess formation. Few small red

papules on back of hand similar to those on face and neck. No nodules felt in ear lobes or eyebrows. No nasal ulceration or signs of inflammation seen. No changes in eyebrows or hair of forearm present. No paralysis or contractures of fingers demonstrable. Along inner side of left forearm, several superficial nodular cords could be felt which were at first thought thrombosed veins but later known to be enlarged nerves. Ulnar nerve not palpable. No areas of increased or diminished sebaceous secretion present. No whitish spots noted. Sensation over spots on forehead normal. Sensation over large lesion above elbow abolished but normally present in the immediate vicinity, except in area next to other nodules. Sensation over crescentic lesion abolished but only diminished in normally appearing skin within tips of crescent. All sensations present but diminished in equal proportion along inner side of left forearm. No paralyses, atrophy or contractures of muscles of left arm, forearm or hand found. No skin lesions, altered sensations or nerve thickening demonstrable in thighs or legs.

Facial expression is sad and somewhat vacant. Superficial and deep reflexes are all present. No abnormal reflexes. A coarse tremor of tongue and hands is present.

Sight is defective. Hearing is diminished with thickened and retracted drums and a healed perforation of left drum. Patient complains of moderate temporal headache at intervals.

Mental age of the patient is subnormal. He shows an excessive emotional reaction, is easily confused, and becomes incoherent in his speech when excited. It is considered that he has a mental deterioration of a pre-senile character. He was not able to become self-supporting after leaving the Army. There are no asocial tendencies. He remains hopeful.

Laboratory examinations:

Motile flagellated parasites in feces determined to be *Lambli*
intestinalis.

Blood smear negative for malaria.

Urine normal except for increased number of pus cells and shreds.

Blood Wassermann reaction negative with Kolmer and Noguchi technic.

Provocative blood Wassermann negative.

Spinal fluid Wassermann: Four plus in 0.2, 0.5, and 1 c. c. amounts. Globulin not increased, cell count 31, colloidal gold 0000000000.

Nasal smear following administration of potassium iodide to produce coryza: Acid fast bacilli occurring singly.

Scrapings from skin lesion on arm showed many acid fast bacilli occurring in clumps. Most showed marked bipolar staining with

Ziehl-Neelsen method, the dots in the ends appearing dark blue. Use of curet caused no pain. Skin lesions on forehead bled so profusely that blood cells prevented observing any organisms. Puncture with glass pipet caused marked pain.

A section of the large lesion above the elbow was made. The section extended across into normal tissue on each side. At operation cocain was necessary, on account of pain in the vicinity of the area. The subcutaneous tissue was not adherent or necrotic. The wound healed promptly.

Tissue section diagnosed leprosy and confirmed by the Naval Medical School, where the following description was given:

"Sections show the epithelium atrophic and pigmented, with a disappearance of the rete pegs. The corium shows a diffuse extensive chronic inflammatory reaction throughout. No areas of giant cell formation nor caseation found. Special stains for acid fast bacilli positive for *Bacillus lepra*. These organisms are found in large numbers throughout the corium, appearing in small clusters within typical lepra cells."

Gram stain, special acid-fast stains, and ordinary tissue stains were unsatisfactory. The ordinary Ziehl-Neelsen method, as used for tubercle bacilli in sputum, gave extraordinarily good results.

X-ray examination of bones of hand showed no definite changes.

When this patient was presented at the medical meeting, those medical officers who had seen numerous leprosy patients in Samoa, Guam, and elsewhere stated that he had a characteristic "facies" common to such patients, but were unable to describe the facies other than that he appeared depressed and to be affected with a serious disease. This appearance could not have been due to any psychic affect, as the patient was not then aware of the nature of his disability and felt well enough to ask to be discharged from the hospital.

CEREBRAL ABSCESS OF UNDETERMINED ETIOLOGY—CASE REPORT

By L. D. CARSON, Lieutenant (Junior Grade), Medical Corps, United States Navy

The patient, R. W. D., following convalescence from an operation for a left-sided hydrocele, was transferred to the ward for tuberculous patients on account of slight afternoon rises in temperature, unstable pulse, lung findings suggestive of pulmonary involvement, and a statement from the X-ray department with the conclusion, "Questionable early peribronchial tuberculosis."

About three weeks following this transfer the patient developed sores upon the right side of his tongue. Dark field examinations repeated daily for a week failed to disclose *Treponema pallidum*, the lesions being found to be due to Vincent's angina. A diagnosis

of tuberculosis was confirmed by a board of medical survey, and the patient recommended for discharge as soon as his oral lesions should have healed.

About a week later the patient showed no improvement in his oral condition and began to complain of a feeling of numbness in the left forearm and hand. Aside from the lingual lesions, examination by the eye, ear, nose, and throat department at this time showed deviation of the nasal septum to the right, sinuses negative, and tonsils which were slightly embedded and cryptic. Several days following the complaint of numbness of left hand and arm the patient began showing definite symptoms of cerebral irritation, such as vomiting, almost of the projectile type, unaccompanied by nausea; persistent occipital headache during the day and usually worse at night; and a semimotor paralysis of the left arm and leg. There was little or no loss of sensation over the left side of the body. He also became obstinately constipated. The pulse rate over a period of 10 days became very slow, at times being only 48 to 52 per minute. Temperature appeared toxic in type, with diurnal fluctuations from one to three degrees.

The patient complained, in addition to the persistent headache and persistent vomiting whenever solid food was ingested, of some stiffness of the neck posteriorly, so that he could not bend his head forward. A positive Kernig's sign was noted. These symptoms were noted on August 4. At this date the Babinski was negative; patellar reflex active on the right and diminished on the left; superficial reflexes normally active. Triceps and biceps reflexes were diminished noticeably in the left arm. Eye signs negative. Blood count on this date was normal, and there was no leucocytosis. On the following day a positive Babinski was twice obtained on the left foot; there was marked diminution of superficial reflexes, and of triceps and biceps jerks on the left. The patellar reflex was exaggerated on the left. There was some impairment of the trigeminal on the left. Optic, oculomotor, abducens, auditory, glossopharyngeal, vagus and hypoglossal nerves were not impaired in function.

Examinations of the eye-grounds under mydriatic showed the following:

Right fundus: Papilla hyperemic and disc margin obliterated. Though the papilla is swollen and elevated the vessels are only slightly engorged. No hemorrhages nor exudates noted. Whole right retina hyperemic.

Left fundus: Temporal margin of disc distinguishable, but papilla as a whole is swollen and red. Elevation not so marked as in the right eye. Appearance suggests intracranial pressure with a descending optic neuritis.

Spinal puncture on above date showed increased pressure at first; flow normal after first 0.5 c. c. Fluid clear, with negative Wassermann; cells, 72 per cubic millimeter with 90 per cent lymphocytes; globulin increased over normal; colloidal gold curve, 1233332100, or within the luetic zone; culture and smear negative for bacteria.

The findings, with the exception of the left-sided paresis and left-sided pathological reflexes, were interpreted as indicative of a tuberculous meningitis, especially in the light of the previous diagnosis of pulmonary tuberculosis.

Between the 5th and 12th of August the pulse rate which had been very low came back to normal, and became apparently a high-tension pulse. Blood pressure reading on the 13th was, 160 systolic, 120 diastolic. Vomiting, headache, and slow pulse rate had disappeared. The chief complaint on the 12th was of intense soreness of the back and neck. On this date the right pupil was noted to be slightly dilated and by the following day it was enormously dilated. The patient began to have periods of delirium and became very noisy. Sphincteric reflexes and tone were lost. Patient took and retained nourishment fairly well, vomiting only once or twice in the last three days of his life.

On the 14th of August the patient was delirious with rational intervals, during which he complained bitterly of a severe headache and blindness. A second spinal puncture was done, and the fluid was found to be under very much increased pressure. It was allowed to drain until the rate of drainage reached normal. A quarter grain of morphine was given half an hour before spinal puncture. The patient felt much relieved immediately following the puncture and fell asleep. At 9 o'clock that night he appeared to have passed into coma and could not be aroused during the night nor during the early morning hours. He died at 5.35 a. m. on the morning following, bleeding profusely from the nose and mouth.

AUTOPSY

A post-mortem examination done within four hours following death showed the following:

(1) An area of dark red discoloration on the skull, just posterior to the vertex in the midline. (2) An area of dark red discoloration and softening of the brain tissue, 3.5 by 4 cm. on the left hemisphere, involving a portion of both the pre and post central convolutions. Section showed the area to be the base of a cone-shaped abscess with the base upon the surface, subdurally, and the apex extending downward toward the base of the brain without involving

the left lateral ventricle. (3) The spinal fluid was clear. (4) Folds of the pia mater over the vertex and around the base and brain-stem presented slight traces of a tenacious whitish exudate very slight in amount. (5) Free blood was found in the left pleural cavity. (6) Small tuberculous cavities measuring about 1.5 to 2 cm. in diameter near bases of left upper lobe anteriorly and the right middle lobe anteriorly. The one on the left communicated directly with the pleural cavity and was filled with dark clotted and free blood. (7) Passive congestion of liver and kidneys. (8) Acute hemorrhagic splenitis.

The abscess in the brain substance was nonencapsulated, and was filled with a sterile, thick, greenish pus, with much cellular débris. No organisms which could be considered causative were found, with the exception of the finding, on culture, of a gram positive diplococcus.

DISCUSSION

This case presents several unusual features. It was obviously a case of metastatic infection, the most probable source being tuberculous, cavitated lungs. Most writers state that brain abscesses due to metastatic infection are very rare, most of such processes being due to the direct extension of infectious processes near the brain, such as chronic otitis, mastoiditis, nasal sinus infections, etc. Metastatic infections of the brain are necessarily hematogenous and as such must presuppose trauma of the brain at the site of the later development of the destructive process. There was no such history obtained in this patient, though that does not exclude the possibility.

Most brain abscesses due to mixed infection, as this case obviously was, run a considerable leucocytosis. In this case the leucocyte count remained around normal.

The spinal fluid in this case presented the characteristic findings of a tuberculous meningitis, minus the meningitic type of colloidal gold curve. The patient's early complaints of headache, vomiting, sore, stiff neck and back, suggested meningitis rather than a focal infection. A positive Kernig was twice obtained.

Then again, this is a case where a demonstrated left-sided cerebral abscess fairly high in the motor area, occasioned a homolateral, rather than contralateral hemiparesis, with no effect in so far as could be clinically determined, upon the motor or sensory function of the opposite side. The abscess did not involve the right brain nor internal capsule, though it was so situated that it might quite conceivably have caused pressure upon these centers.

FRACTURES OF THE HEAD OF THE RADIUS—WITH A REPORT OF FOUR CASES¹

By W. S. LEAVENWORTH, Lieutenant, Medical Corps, United States Navy

In the past four months we have had four cases of simple fracture of the round button-like head of the radius under treatment in the Orthopedic Ward of this hospital, and as this is a rather unusual type of fracture I desire to report the cases.

Formerly these fractures were considered rare, as may be judged by the fact that Stimson, in the eighth edition of "Fractures and Dislocations," speaks of his having had only 14 cases; but the recent great increase in the use of X rays upon suspicious sprains of the elbow joint has shown such an increase in the number of cases recognized that we must conclude many cases were formerly overlooked, not diagnosed as fractures but treated as severe sprains.

ANATOMY

The superior articulation of the radius with the ulna is accomplished by means of the orbicular ligament, which, forming about four-fifths of a circle, enslings the radial head and holds it firmly into the cavity of the lesser sigmoid notch of the ulna. This articulation is further marked by the round flat top of the radius articulating with the capitellum of the humerus, and it is this end-to-end forcing together of two long bones that is responsible for the rather peculiar nature of this fracture, in that transmitted force along the forearm drives the radial end against the humerus and splits off a segment of the button-like head. Comminution does not appear to be frequent, nor is displacement often seen, since the orbicular ligament holds the detached piece of bone practically in position.

ETIOLOGY

The fracture is usually received by a fall upon the pronated hand while the forearm is stiffly extended upon the arm, and three of our cases gave a definite history of such transmitted force, while the fourth patient could not remember the details of the fall. It is significant that the elbow showed no contusions.

The detached segment of bone appears to consist usually of from one-third to one-fourth of the entire head, and it commonly is not detached from its periosteum.

Complications are described, such as extensive comminution of the entire head or displacement of the detached fragment into the joint with jamming between the articular surfaces.

¹ From United States Naval Hospital, San Diego, Calif.

PROGNOSIS

The prognosis is good, although Hitzrot reported 19 cases and stated that in all but two of these supination and pronation were lost to the extent of 50 per cent, and Preston states that union can not be expected where the fracture is confined to the head of the bone.

Scudder, however, writes that, with proper treatment, recovery of function should be complete, and all four of our cases recovered at least 90 per cent of their full motion, and in all of them complete extension of the forearm was the last functional motion regained and the one that deviated most from normal.

TREATMENT

Treatment should consist of immobilization of the elbow at a right angle, with the forearm in semipronation (in order to relax the biceps) for a period of from 10 days to 4 weeks, governed largely by the amount of muscle spasm still present and the amount of original damage. This to be followed by passive motion, daily bakes and massage, and then active movement. It is important to tighten the splint from day to day as the swelling subsides, and one has to think also of excessive callus formation from too early or too vigorous motion, also of nonunion of the fragment.

Preston advises early motion, as he states union can not be expected, while Scudder states that union should be sought first through immobilization and motion obtained after union has resulted.

CASE REPORTS

Case I.—E. F., sea. 1c., age 26 years. On October 24, 1924, while launching a seaplane, patient was thrown to the concrete deck striking upon his pronated hand. Typical signs and symptoms were present in moderate degree. X-ray examination showed the anterior half of the radial head (right) fractured, but position excellent. Splinted in a posterior, plaster of paris, gutter splint, with forearm at about 45° with the axis of the arm. November 11, 1924 (18 days): Splint off, arm in sling, daily bakes and massage with passive motion. November 21, 1924, (28 days): Sent to duty; good motion but some increase in the carrying angle, i. e. abduction of the forearm upon the arm.

Case II.—J. L. R., pvt., U. S. M. C., age 24 years. On December 6, 1924, slipped in the mess hall and fell, striking the bulkhead with his outstretched arm and forearm. Typical signs and symptoms were present in mild degree but a faint crepitus was elicited. X-ray examination showed simple fracture of left radial head, with position good. The arm was placed in a right angled, posterior, wire elbow-

splint and on December 18, 1924 (12 days), the arm taken out of splint daily for bakes, massage, and passive motion. On December 26, 1924 (20 days), the splint was left off and arm carried in a sling. January 9, 1925 (34 days), the patient was sent to duty with practically normal motions.

Case III.—R. C., app. sea., age 22 years. On December 1, 1924, he fell from his hammock striking the deck with the palm of his hand, also sustaining fracture of the left patella. Typical signs and symptoms were present to moderately severe degree. The X ray showed fracture of the left radial head with excellent position of fragment. Elbow splinted in right angle, posterior, wire splint and on December 15, 1924 (15 days), the elbow was taken out daily for bakes and massage with passive motion. On December 28, 1924 (28 days), the splint was discontinued and on January 27, 1925 (57 days), he went to duty with practically normal motion.

Case IV.—H. S., supernumerary, age 30 years. On December 31, 1924, he fell from a street car receiving what the patient thought was a sprain of the right elbow joint. Typical signs and symptoms present in rather mild degree and the X ray showed fracture with fair position. Arm splinted in a posterior, wire elbow-splint and on January 10, 1925 (10 days), we started passive motion with bakes and massage. On January 14, 1925 (14 days), the joint was taken out of the splint and carried in a sling. The patient was discharged on January 24, 1925 (24 days), with some limitation of motion but on February 20, 1925 (51 days), motion was practically normal and an X-ray examination showed the fracture healed.

THE FOUR-POINT METHOD OF LOCAL ANESTHESIA FOR HEMORRHOID-ECTOMY

By L. H. WILLIAMS, Lieutenant Commander, Medical Corps, United States Navy

The operation for hemorrhoids is often made a major operation unnecessarily because of the general anesthetic administered to obtain anesthesia and relaxation of the anal sphincter. On ship board and at small stations where using a general anesthetic is an event, because of the few occasions for its use and the resultant lack of a skilled anesthetist in addition to the medical officer in charge, there is often hesitancy to operate on hemorrhoids. As a result, palliative treatment is given for immediate relief and the man is transferred for operation at some convenient opportunity. In the interval the patient has perhaps had a recurrence, with an increase in the pathological condition, and many sick days have been added to his record. All of this is, in most instances, unnecessary. A complete and thorough operation for hemorrhoids can be performed under

local anesthesia quickly and with ease to the operator, and with no, or very slight, pain to the patient.

Local anesthesia is entirely adequate for obtaining relaxation when properly introduced. The argument long advanced for general anesthesia in rectal work, that relaxation sufficient for revealing adequately the internal hemorrhoids can only be obtained by a general anesthetic, is not borne out by experience. The method has been used for several years by proctologists, but has not as yet gained the widespread acclaim by the surgical profession that it is entitled to.

Novocaine is the anesthetic of choice. Occasionally there may be encountered slight evidence of novocaine poisoning. This may be avoided by the simple expedient of keeping the needle advancing while the solution is being introduced. In this way, though a vein should be pierced, little of the solution is allowed to enter the blood stream.

The patient is prepared as for a general anesthetic and put in the lithotomy position. The bowels should have been cleaned out by a cathartic the day before and a good soapsuds enema the morning of the operation. The anal regions should be shaved. One per cent picric acid in water is good for sterilizing the skin. Novocaine solution, 0.5 per cent with 4 drops of 1-1,000 adrenalin chloride solution to the ounce, is used as the anesthetic. Circuminjection of the anus is the end desired, and it may be obtained as follows: Four points of entrance are marked out around the anus about 1 inch from the anal orifice. One is located in the median raphe, anteriorly; one in the median raphe, posteriorly; and one on each side. An intradermal wheal with a small hypodermic needle may be made at the points selected. This allows painless injection with the larger needle. It, however, is not necessary. From these points the solution is injected. The needle should be slender, sharp, and about 10 centimeters long. It should first be introduced perpendicularly at one of the lateral points parallel to the wall of the rectum and should penetrate the sphincter and the levator ani. The needle is then partly withdrawn and passed obliquely in an anterior and posterior direction to its full length. Care must be taken to avoid injury to the urethra. At least 5 centimeters of the 0.5 per cent solution is injected with each insertion of the needle. The same method is followed at the three other points. Sixty centimeters of the solution should be used, and more if necessary. In fat persons more is required. The position of the needle may be controlled by a finger in the rectum. This is advisable until the operator becomes familiar with the technique. The sphincter begins to relax with

the first injection and, by the time the four points are completed, dilatation to the extent desired is easy and painless.

After anesthesia is produced and the sphincter dilated, any type of hemorrhoidectomy can be performed. The Allingham method of clamp and suture is an excellent one and gives the added comfort of small chance of postoperative hemorrhage.

Convalescence is considerably shortened. The patient is out of bed by the third day, often the second. He is allowed liquid diet the day of the operation, a light diet the second day. There is considerably less local reaction due to the lack of congestion incident to the straining induced by a general anesthetic. If the anesthetic be properly introduced, no ill effects may be expected.

Reference: Braun & Shields: Local Anesthesia.

AN ATYPICAL CASE OF SERUM SICKNESS

By J. T. BOONE, Lieutenant Commander, Medical Corps, United States Navy

Physicians who have seen severe infections in children following injury are always particularly concerned in dealing with even minor injuries in this class of patient. It is never wise to fail to administer wound and general prophylaxis. Seemingly trivial infections may terminate fatally. In practicing prophylaxis the possibility of anaphylaxis and pronounced serum sickness must be borne in mind. There is reported below a particularly interesting case of serum sickness following antitetanic inoculation.

J. F. M., jr., a child of 8 years, ran a rusty nail into the fleshy part of the palm of the right hand Sunday morning January 25, 1925, while playing in the vicinity of a building operation. The patient was taken to a surgeon, the wound cleansed, explored, cauterized, and dressed with a wet dressing. The next morning he was given approximately 1,200 units of antitetanic serum, injection being made just below the scapula on the right side. That afternoon, some seven or eight hours after inoculation, the patient vomited and was quite sick and restless throughout the night. The following day gastric symptoms had passed away and the patient seemed little worse for his reaction.

As the surgeon who originally dressed the case was leaving the city, the writer was requested to care for the wound. Redressings were done Tuesday, Wednesday, and Thursday, with the wound healing nicely and the absence of any evidence of infection resulting from the injury. Special attention was exerted for the detection of the first appearance of oncoming lymphangitis or lymphadenitis. Experience in a recent well-known case impressed the writer with the wisdom of recognizing the primary symptoms of wound extension.

Late Thursday evening, or four and one-half days after injury, the parents reported that the boy complained of slight soreness in

the right arm pit; but, as the writer had inquired of the patient that same afternoon as to the consciousness of pain or discomfort in this locality, the mother thought there might be the element of suggestion to bear in mind. Early the next morning (Friday)—five days after injury and four days after inoculation—the doctor was telephoned to and told that there was definite pain in the right axilla. A visit confirmed this symptom. At this time there was present a glandular enlargement about the size of an ordinary marble. The wound was clean and practically healed. There was no lymphangitis. Other than temperature of 102 there were no other symptoms.

A return visit that afternoon found the child quite sick; temperature approximately the same as in the morning (102), considerable glandular enlargement in the right axilla with a protrusion of the right pectoralis major, the presence of an urticarial wheal in the skin at the anterior axillary fold. With the original wound apparently healed, and in the absence of any lymphangitis, it did not seem possible that this complication came from that source. Inspection of the site of antitetanic administration showed a large erythematous plaque extending half way over the right scapula to the small of the back. This erythematous area looked well circumscribed with the appearance of fading in its center.

A civilian surgeon and pediatricist were summoned who felt that the condition was due to possible infection from the prophylactic inoculation, although it was recognized that the glandular enlargement in the axilla appeared to be confined to the anterior or pectoral group of glands instead of the posterior or subscapular group as one would expect to find. The child was seen late that evening when the findings of the late afternoon were somewhat exaggerated.

Saturday morning, January 31, and six days since the injury occurred, the temperature had dropped one degree, but there was general glandular enlargement evident. The inguinal, epitrochlear, axillary, submaxillary, cervicals—all were much enlarged. There was present a huge wheal over the initial site of the erythematous plaque noted the night before. A macular rash was present over forehead, extremities, back, and trunk. An edema of the forehead was pronounced. The eyeballs were injected and there was photophobia; pupils were dilated but reacted readily; cheeks flushed; the jaw was opened with difficulty. Joint pains were absent. The skin was tender and itchy. The child did not want to be touched. Restricted and painful movement seemed to be due to glandular enlargement. There was slight cough and slight nausea. White blood count was taken at 10 a. m. Saturday and was reported as 16,000. Another laboratory took a specimen at 2 p. m., reporting 10,800 white blood cells, polymorphonuclears, 74 per cent; lymphocytes, 23 per cent; large mononuclears and transitionals, 3 per

cent. Blood culture taken at the same time showed no growth 48 hours after incubation. Urine was practically negative except for high specific gravity. Consultation with pediatricist and surgeon was repeated late Saturday afternoon, when there was a noticeable difference on the side of improvement in the patient's condition. From 4 p. m. on there was distinct improvement. Sunday, one week after injury and six days after inoculation, the symptoms had greatly subsided. There was lessened glandular enlargement; the edema had disappeared; there was very little rash; temperature was 99; weakness noticeable but patient desired food. Constant improvement continued and the patient by Tuesday, or eight days after inoculation, was practically well.

This was a case of serum sickness not conforming with written authority referred to and baffling for some hours to the physicians in attendance as well as to experts on such conditions who were consulted.

While resembling serum sickness because of the urticaria present and the history of antitetanic inoculation, the case Friday evening and most of Saturday presented a picture more characteristic of systemic infection with the origin very probably at the site of subcutaneous injection for tetanic prophylaxis.

The points stressed in the diagnosis of serum sickness have been the onset usually occurring about the ninth day, the joint manifestations, the rash, and the localized glandular swelling nearest the site of injury. In this case, in contradistinction to textbook statements, we had the disease appearing four days after inoculation, the total absence of joint pain or tenderness or any joint symptoms whatever, and the marked general glandular enlargement.

The rapidity with which most of the pronounced symptoms—general glandular hypertrophy—appeared and the acuteness of other symptoms, had the case been one of infection, would have made the prognosis grave, indeed.

It would seem the part of wisdom to make a practice of carefully saving a sample of sera used until the period of total reaction has passed, so that investigation of the sera might be conducted where there is any doubt as to the possible cause of a pronounced reaction. Of course the possibility of contamination must be borne in mind.

This case report was forwarded to Dr. John A. Kolmer, of the Graduate School of Medicine, University of Pennsylvania, who kindly permitted his comment to be included in this report:

"I have few comments to make other than to state that I am in thorough agreement with your conclusions regarding the nature of this unusual reaction.

"Involvement of the glands generally accompanies serum sickness even though the polyarthrititis is absent. In this case the early

involvement of the glands in the right axilla constitutes the main peculiarity and point of special interest in view of the fact that it was logical to suspect infection as the primary cause. At this writing I can not recollect having seen exactly the same thing in a very large number of cases of serum sickness that have passed under my observation. Evidently the tissues nearest the site of inoculation of serum are first to show the effects of allergic shock; this was shown in your case by the development of the skin rash about the site of inoculation and by the peculiar enlargement of the axillary glands. Serum sickness four days after inoculation is not of itself unique or exceptional, but the early glandular enlargement is of peculiar interest, and the whole development is very clearly and nicely expressed in your paper."

A CONSIDERATION OF VARICOCELE

By J. L. THORNTON, Lieutenant (Junior Grade), Medical Corps, United States Navy

In my short experience in the Medical Corps of the Navy I have been much impressed by the large number of men in the service who are being admitted to the hospitals for treatment of varicoceles. I have had occasion to examine a number of these men and I find that a large percentage have very small varicoceles, many almost insignificant. They complain of some heaviness and pain in the scrotum when marching or doing heavy work, but more important than this, they have the idea that they will become sexually inert if this condition continues.

In a number of cases, where it has been explained to men with varicoceles that they will not be affected sexually and that they will in all probability have no trouble from the condition, it has been possible to discharge them to duty without operation. This, however, does not hold true of all cases with small varicoceles, possibly because of the type of patient, but more probably because of the lack of patience on the part of the doctor in his explanation.

In the past four months we have performed six operations for varicocele. In all but two cases we did the simple ligation, combined with resection of a small portion of the veins, tying the stumps together. In one case we did the simple ligation plus shortening the scrotum. In another case a modified Skillern operation was done, modified to the extent that the veins were resected only at the external ring and about 1 inch above the testicle, and the stumps were tied together.

Another case, which was operated upon in another hospital, was sent to us for convalescence.

In all of these cases there resulted a column of induration including the testicle and epididymis and extending from these organs

through the external inguinal ring. In the case of the last patient, when he complained of pain in the penis in erection, examination disclosed thrombosis in the dorsal vein of the penis.

The column of induration seems to be caused by: (1) Limited resection of veins with end to end suture of the stumps. This results in stagnation of the blood in the closed vessels with formation of a lump at the site of the stumps. (2) Failure to obliterate the dead spaces established by the dissection of the fascial layers. These dead spaces furnish room for the outpouring of blood and tissue juices after the operation. (3) Irritation of the vas deferens by rough manipulation.

Upon examination of these patients for discharge to duty after four or five weeks of hospitalization, one can come to but one conclusion and that is, that our present operative methods for the care of varicocele are not successful.

In the treatment of this condition I think we would be wise to discourage operation for small varicoceles. In the case of those who have large varicoceles and where we can be sure they are producing symptoms and an operation is necessary, I believe we should use Dr. P. G. Skillern's method,¹ as he reports excellent results.

Briefly, Doctor Skillern's method consists of an incision as for herniorrhaphy down to the cord, dividing the fascia. The anterior veins, which are the ones varicosed, are dissected down to the testicle, the spermatic cord not being disturbed. This whole group of veins is removed at the testicle and internal inguinal ring. The stumps are not tied together. Doctor Skillern reports that, after employing this method of operating, he has not once seen the column of induration referred to above.

GOLD BALL IMPLANTATION AFTER REMOVAL OF THE EYEBALL

By A. H. CECHA, Lieutenant, Medical Corps, United States Navy

In this article there is described a new surgical procedure for implantation of a gold ball in Tenon's capsule after removal of the eyeball. So far as is known, this procedure has not been described before in the literature pertaining to eye surgery, and since it has decided advantages over former methods and results following its employment are practically always satisfactory, which can not be said of the other methods, it should find ready acceptance wherever enucleation of the globe must be performed.

Credit must be given to Dr. Isidor Goldstein, of the New York Eye and Ear Infirmary, for the originality of this operation. The principle was evolved on anatomic grounds after many failures, due to extrusion of the artificial globe, had occurred with other procedures.

¹ Skillern, P. G., Jr., The Varicocele Operation. *Ann. Surg.* Vol. 72, 1920.

The purpose of fixing a foreign body in Tenon's capsule is, first, to produce a better prosthetic effect by having a normal contour of the eyelids, as otherwise there would be an ugly depression, particularly of the upper lid; second, to obtain greater mobility of the globe by having the extrinsic ocular muscles in normal relationship to each other, thus utilizing their normal traction power; and, third, to obtain a firmer base upon which to place the artificial glass eye. These three considerations are very important from a cosmetic point of view to the person who has been so unfortunate as to lose his eye.

Instead of using an unorganized object, such as a glass ball, a gold sphere or a paraffin ball, fat, bone, or cartilage has been used with the purpose of having the capsule unite with these tissues and so prevent extrusion. The fault with these organized bodies has been that, in time, they will undergo atrophy and the very effect for which they were used is lost.

The eyeball is enucleated in the usual way; then, with the aid of an assistant who holds the ocular conjunctiva, the operator grasps Tenon's capsule and separates these two layers with a strong pair of scissors for a distance of 7 mm. The conjunctiva and Tenon's capsule are similarly separated below. After the sutures have been properly placed the gold ball is inserted into the capsule. Three double-armed sutures are used to bring the flaps together in the following manner: The center and two wing sutures are passed through the lower flap of Tenon's capsule about 1 mm. from its border, the ends of each suture being passed from within out about 3 mm. apart, then, going to the upper flap, they are passed through it from within out from 4 to 6 mm. from its free border, so that, when the three sutures are tied, an apron from 4 to 6 mm. long descends over the lower flap. The lower border of this apron is sutured to the lower flap by four interrupted sutures, one between each pair of the above sutures and one on each side. The conjunctiva is sutured horizontally by three interrupted sutures. The sutures in Tenon's capsule are tied three times and cut close to the knots, for if the threads are left long an effort at expulsion might take place and thereby prevent good union. The suture material for the capsule is three-ply chromic catgut and for the conjunctiva it is silk thread. This method of suturing holds the flaps together firmly, even under undue pressure from the implanted gold ball, and sufficient time remains for a firm union to take place before absorption of the ligatures occurs.

The essential part of this procedure is the utilization of Tenon's capsule whereby flaps are formed so that by bringing one over the other two broad surfaces are made to coincide. After healing has taken place, separation can not occur on account of the strength of this union and the implanted sphere remains fixed permanently.

REPORT OF A CASE OF MUMPS WITH CEREBRAL COMPLICATIONS

By F. D. WALKER, Lieutenant, Medical Corps, United States Navy

In the military services mumps is regarded as a benign disease that causes a relatively large number of admissions to the sick list and a considerable loss to the service through sick days. As an infectious disease mumps occupies an insignificant place and receives serious consideration almost entirely on account of its complications.

Mumps presents a wide variety of complications. Some of them are of frequent occurrence. For instance, at Camp Lewis, epididymitis and orchitis occurred as a complication in 33 per cent of the hospital cases.¹ On the other hand, pancreatitis and cardiac and pulmonary involvement are among the rare complications. Other very infrequent complications are mentioned, such as involvement of the eye and ear.

Also cerebral symptoms may occur as an infrequent complication in mumps. In all about 150 cases have been reported.² The symptoms generally occur at the height of the disease and usually consist of headache, vomiting, and stupor. Also the cerebral symptoms may occur before there is involvement of the parotid or submaxillary glands. A case presenting this condition is reported as follows:

R. M. H., white, age 17, was admitted to the hospital January 15, 1925, from the naval training station. At that time mumps was mildly epidemic at the station. On admission, there was no indication of involvement of any of the salivary glands. The only symptoms observed were those indicating meningo-encephalitic involvement. The patient was fully conscious at times and at other times he would have to be aroused in order to elicit answers to questions. There was severe frontal headache with photophobia and patient was stuporous; the head and neck were retracted and there was tenderness on pressure along the cervical and lumbar spine; there was marked twitching of the right leg and the skin was hypersensitive to external stimuli; Kernig's sign was present; there was severe vomiting of the projectile type. Temperature 101, pulse 118, respiration 20.

Lumbar puncture withdrew only 10 c. c. of opalescent fluid which was not under pressure. This was replaced by 10 c. c. antimeningococcic serum. Direct examination of the spinal fluid was negative for meningococci. The white blood count was 11,000 with 48 per cent neutrophils, 50 per cent lymphocytes and 2 per cent transitionals.

¹ Medical Clinics of North America, September, 1918.

² Lucas: Oxford Medicine, vol. 5, p. 494.

January 16, headache with photophobia continued severe; stupor more marked so that patient could be aroused with difficulty; temperature in morning 104.4° F., in evening, 104.2° F.

Cultures of the spinal fluid and of the blood were negative at this and subsequent examinations for meningococcus.

January 17, left parotid gland swollen and having the characteristic appearance of a severe attack of mumps. Temperature, a. m. 103.8° F., p. m. 100.2° F. Vomited during the morning; patient asleep most of the time and when awake was irrational, restless, and noisy. Does not complain of headache.

January 19, temperature, a. m. 99.8° F., p. m. 102.2° F.; slight headache; stiffness of neck less; talks rationally; reflexes normal except slight Kernig is present.

January 21, right and left submaxillary glands involved; temperature, a. m. 100.6° F., p. m. 98.4° F. Vomited in the evening; mental dullness has returned and patient now sleeps most of the time.

January 23, temperature normal; salivary glands practically normal; patient continues to sleep a great deal and when awakened appears disoriented.

During the early part of the patient's convalescence he would lie in bed apparently asleep most of the time. When he became able to be up and about he seemed apathetic, and on a few occasions exhibited some emotional instability. About February 10, the patient recovered his normal mental condition and was eventually returned to duty.

MUMPS

A FEW REMARKS ON TREATMENT

By H. L. FOUGEROUSSE, Lieutenant, Medical Corps, United States Navy

Mumps rarely becomes an economic problem and is usually regarded as one of the innocent diseases which befall childhood and adolescence. Custom, common sense, and science join hands in the decision that mumps can best be controlled by isolation. This being the case, it is not difficult to appreciate how the creation of a great army or the extensive expansion of a navy may be almost indefinitely postponed and delayed by an outbreak of mumps among the thousands of young recruits who are to be molded into a fighting machine.

Mumps, *per se*, means nothing more than a few days of inconvenience; but mumps, with metastases, is an entirely different problem and exacts a quarantine period and corresponding loss of time

of from three to six weeks. Added to this, if the testicles be involved, is the harrowing possibility of sterility, a calamity both for the individual concerned and the country of which he is a subject. It is interesting to note in passing that the remarkable metastasis of this specific infection, in so far as the testicles are concerned, has never been satisfactorily explained. Military surgeons, who see much of the disease among young recruits and are therefore best qualified to theorize, have suggested that the infecting element is transferred to the penis by the fingers and its ultimate transmission is along the urethra. On the other hand, during the latter part of 1918 and early part of 1919 at the United States Naval Hospital, New Orleans, it was rather definitely shown that early treatment of parotid infections with convalescent serum prevented testicular metastasis.

During a recent outbreak of mumps among recruits at the United States Naval Training Station, Great Lakes, Ill., opportunity was afforded to test the efficacy of treatment by diathermy in the metastatic cases involving the testicles. About 60 cases have been admitted to the United States Naval Hospital at this writing. Of this number, 11 developed testicular complications, characterized by the usual signs and symptoms of swelling and intense pain, with nausea. As discovered, these cases were immediately treated along the lines employed in the department of urology for the handling of gonococcic epididymitis and allied disorders. A Corbus clamp is used with the diathermy apparatus. The treatment covers a period of one-half hour each day, and precautions are taken to prevent the elaboration of too much energy, which might accomplish one of the objects we are endeavoring to prevent—sterility. Invariably, the results obtained were most satisfactory. All pain practically subsided during the first treatment and the progress of the inflammatory changes was arrested. Resolution was greatly hastened in all cases. Twenty-four hours after the first treatment the clinical picture was completely changed. With suitable apparatus, treatment of the parotids or primary foci should cut short the disease before metastasis can occur. We are now working along this line. Medical science is progressive—sometimes the progress is by tiny steps.

NOTES AND COMMENTS

SPECIAL ANNOUNCEMENT

It is with great regret that the editor feels it incumbent upon himself to announce that, in the interest of economy, it has become necessary to discontinue for the present the section of the Bulletin devoted to Notes and Comments, and furthermore that it will, in all probability, be necessary to combine at least two forthcoming issues into one in order to reduce the expense of publication. The present intention is to combine the September and October numbers and to issue the combined number in October. This announcement is made in order that those readers who are attempting to keep their files complete may understand the nonappearance of a September number and not feel that their copies have gone astray.

Under an order of the Director of the Budget, the cost of the Bulletin for any fiscal year *must not* exceed the sum allotted. During the present fiscal year the cost of printing at the Government Printing Office has been considerably increased. In spite of every effort to keep the cost of the Bulletin within the authorized limit by materially reducing the number of pages, illustrations, and tables, it now appears that it will be impossible to continue its monthly publication, even in its present abridged form, for the remainder of this year. This unfortunate situation has arisen through the fault of no one connected with the publication of the Bulletin, but it is nevertheless a cause of genuine regret to all.

NAVY NURSE CORPS

Recently Miss Mary M. Roberts, editor of the American Journal of Nursing, spent a week in Washington to get a better insight into the work of the United States Government Nursing Services. She was very enthusiastic over the work accomplished and wished to impart to the nursing world at large some idea of the opportunities for nurses which the Government offers. To accomplish this a series of articles has been published in the American Journal of Nursing on the Federal Nursing Services.

While here Miss Roberts was entertained one evening by the Graduate Nurses' Association and the District League of Nursing Education and presented a most interesting paper on "The Spirit of Nursing." We are fortunate in being able to present this paper to the nurses.

THE SPIRIT OF NURSING

To me the spirit of the true nurse is one of the most beautiful gifts of a bountiful Creator. I venture to discuss it only because almost daily I have marvelous opportunities for the exchange of opinion, through conference or correspondence, with some of the most shining souls in our profession, and I should like to say that the luminous thing that shines back of the work of the true nurse is quite as apt to be found in the obscure as in the great. The quality of the spirit is the same whether it be found in the relatively unknown but well-beloved nurse or in the conspicuous leader who, in addition to her spiritual quality, was born with certain other characteristics that have advanced her from the ranks.

One of the functions of an editor is that of sensing trends of thought and feeling and of interpreting them for those less fortunate in their daily contacts. One of the disadvantages is that she sees far too little, for her soul's sake, of the actual care of patients and the actual teaching of students, but there is one phase of this subject I *know* I can talk about, and that is the expression of the spirit of nursing which is called comradeship, for in city after city and town after town I have met nurses, utter strangers, who have given their time, their knowledge, their hospitality with lavish hand to further

my work and happiness. It takes real spirit to do that at inconvenient times.

The spirit of nursing is one of the most indestructible elements in the lives of those who possess it. Like fine steel, it gives form and substance but yet is flexible, it is shining but durable. It is made up of such qualities as *courage*, the quality Barrie calls "The Lovely Virtue the very rib of Himself God gave to His Children," *love of truth*, with the accompanying characteristics of frankness, fidelity and sincerity, *kindliness*, *tolerance*, *courtesy*, *generosity*, *compassion*, *sympathy*, and *benevolence*.

It is that quality that has, through all time, made good mothers tender with their little ones; that led Miss Nightingale into the Crimea; that takes the Delano nurses into rural districts; that makes Red Cross nurses "over-subscribe" any demand for volunteers; that makes the good private duty nurse a household word in the home which she has served.

It is, perhaps, best of all expressed in that type of loyalty that keeps a nurse on her job in the face of discouragement. It is one of the things of which the possessor never speaks and of which she is probably unaware except as it is translated into terms of happiness. I have noticed that it is sometimes unconsciously expressed in the indignations and anxieties of such nurses when they see patients receiving less than their due care and consideration. These are things with which you are all as familiar as am I. I simply happen to be in a position to see *more* than some of you.

What reasons have we for discussing this topic at this time?

(1) Our sometimes contested claims to professional recognition, (2) rather frequent subversive statements to the effect that "nurses are not what they used to be," and (3) the spiritual unrest of the world.

It would be an easy matter to spend the entire time allotted me on the one question "Is Nursing a Profession?" I shall content myself with quoting two men whose opinions we respect. In 1915, Doctor Flexner, discussing the topic "Is Social Work a Profession?", laid down the following criteria as a basis for judgment:

- a. Professions involve essentially intellectual operations with large individual responsibility.
- b. They derive their raw material from science and learning.
- c. This raw material they work up to a practical and definite end.
- d. They possess an educationally communicable technique.
- e. They tend to self-organization.
- f. They are becoming increasingly altruistic in motivation.

Doctor Flexner believes ours is a "twilight case" because of our more or less subordinate relation to medicine; but Doctor Kilpatrick.

of Teachers College, makes out a better case for us. He believes that:

"(1) A profession is a vocation by implication gainful, involving the individual and thoughtful application of a considerable body of organized knowledge in self-identifying service for others for the good of society.

"(2) No nurse is merely the means to the health of the patient, still less to the success of the physician."

You will note Doctor Kilpatrick's emphasis on "self-identifying service," which is, of course, the exact opposite of the old idea of self-abnegation. I think we could agree that our better nurses, those who are animated by real purpose and who are constantly striving to improve the quality of their service through study and observation, are beyond doubt professional workers.

What of those who do live for the moment; who concern themselves little or not at all with opportunities for advancement; who consider our professional organizations a nuisance and a bore? These are the nurses who call down upon the profession as a whole the charges of selfishness, commercialism, and of being more concerned with income and ease of living than with the quality of service.

It might be well to remember that many of these could be helped out of the slough in which they are. Others, perhaps, will really never be professional workers, but that should not be a matter of too great discouragement, since it is true of the other professions as well. It behooves us, however, since ours is a young profession, to see to it that we have a decreasing rather than an increasing proportion of such persons. The article in the October American Journal of Nursing, called "The Trained Nurse—A Plea and a Protest," offers food for thought in this connection.

Another charge commonly made nowadays is that we are producing "supernurses." I have never met a supernurse of the type implied, for I interpret the term to mean a supercilious, cold-blooded, highbrow sort of a person who is altogether an egotist; one whose nursing is remote, reminding one of the story of Pat's advice to Mike to the effect that if he would go to the drug store and buy some rubber gloves he could wash his hands without wetting them. Those who talk of supernurses seem to think that such nurses expect to nurse without nursing! I am not afraid of the supernurse. Most of us are all too well aware of our ignorance and too busy trying to keep up with the demands upon us, to be in danger of being super-anything!

Then there is the third charge—that against the young nurse whose real life is lived off duty and who is therefore concerned much

with hours and compensation, and little with the comfort and happiness of the patient.

There are two places to look for the answers to the questions raised by these charges:

- (1) In contemporary life,
- (2) In schools of nursing.

The life of our times does tend to be materialistic and people seem to have a tremendous urge for possessions. A nervous unrest and lack of real purpose is everywhere apparent. At the same time, I believe there is a tremendous yearning for truth, especially spiritual truth and for stable ideals. Anyone who will go from church to church can easily confirm that statement, for the churches that are packed Sunday after Sunday, are those that seem to be making a real effort to bring together the ideals of the past and the science and learning of to-day.

We are told that this is an age of self-expression and that nursing is repressive, but is there any conflict between self-expression and a life of service? Each one of us has a Doctor Jekyll and a Mr. Hyde in us. It seems to me that we all have a choice as to which of these selves we will express, but always there will be some conflict—the conflict between egotism and altruism. Study the lives of some of the greatest altruists of all time and we find no lack of self-expression. There was no lack of self-expression in the life of Christ even when he said, "Thy will, not mine, be done!" Francis of Assisi had every opportunity for a life of self-expression as a man of wealth and leisure, but had he followed it the world would have lost one of the most beautiful characters in all history. Was there any lack of self-expression there? Read "The Little Flower of St. Francis," if you doubt me. Was there any lack of self-expression in the life of Florence Nightingale? Her family didn't think so when she refused to follow the path laid out for her. Who that has read Strachey's "Eminent Victorians" would hesitate to say that she had expressed herself?

There is no reason why the young woman of to-day need fear repression; suppose she does wear her hair and clothes in a way we did not dream of in my youth! I well recall the comments on the pompadours and "merry widows" of my blossom time, but we seem to have survived the perils. And, assuming that our heads contain sound sense, there is hope for the bobbed head, too!

Nursing offers opportunities for self-expression of a high order; if you don't believe it, look about you and contemplate the achievements and the characters of some of your colleagues. They will fully justify you in making that statement to prospective students.

The life to-day is showing many materialistic tendencies, but I firmly believe that the very unrest I have noted is a healthy sign

and will eventuate in an adherence to those things that are of real worth.

I have said we should look in our schools for the answers to some of our problems. Nurses need character and brains as well as manual skill. Perhaps the most pronounced difference between the schools of 10, 15, and 20 years ago is that the character formation was not looked upon as a function of the earlier schools because students entered with characters already formed, and there was no tremendous demand for nurses that made it a matter of expediency to take a chance on doubtful ones.

We are not so concerned about a proper supply of brains, although here we tend to place a blind faith in our educational requirements.

The most important function of the school of nursing to-day is that of character formation, and, although our students are young enough to be plastic when they come to us, we are not facing the problem very squarely, for while we deplore the lack of home training we have not yet very generally supplied the needed substitute. If this is to be found, it would seem important that the directors of our schools should know what really brought each student to her door. With some it will be the necessity to earn a livelihood and little thought will have been given to any other aspect of nursing. *There is the potential time-serving graduate nurse.* She will need careful guidance. Some will enter only because of a desire to get away from a small-town home. This type may make useful nurses if wisely guided or they may become a menace to the profession. Many will come from motives of genuine altruism, and these are the most precious possession which we have. It is tragic that the idealism of some of them may be killed by the pressure of the day's work, by the sacrifices we make to hospital efficiency through the over-development of routine, by what has well been called a factory method of mass production.

Nor is the process of character formation wholly a matter of the time on duty. One of the standards for judging the educated person is by his use of leisure. These unformed young people must be taught, if they do not already know, the wise use of leisure; and that is no small problem in itself, but the success of many of our schools in this field offers much of hope, for increasing thought is being given to Student Government organizations and to the various means for promoting religious, social, and cultural activities.

What is the effect of all this on the curriculum of our schools?

The process of character formation goes on continuously on and off duty. It should not be lost sight of for a moment. The written curriculum must take cognizance of this, for we need more actual case-study in every branch of nursing in order that students may know of the patient's condition, in addition to being given a knowl-

edge of and the skill to nurse the condition before them. They must be taught the care of fellow human beings—not mere cases or patients.

As you know, the standard curriculum is now being revised. Those sections which have particularly to do with the matter of character formation are receiving very thoughtful attention, particularly as it is difficult to get in the requisite number of hours. The History of Nursing can be made vivid, vital, and stimulating by good teaching. Most nurses, I am sure, would concede that one of the strongest forces in their lives is the example of others. The history of the profession, as outlined and well taught, gives young nurses a respect for the profession they can get in no other way, and the lives of great nurses, particularly of those who are practicing to-day, can be made deeply stimulating.

The social aspects of nursing must receive more attention than in the past. I have already indicated that it should be included in case-study, but most schools can not do enough of this type of teaching to fill the whole need. It seems imperative that students be taught to look for the social causes of illness, and that this be done by utilizing out-patient departments and by inclusion of public health nursing in the undergraduate course to a vastly greater degree than has yet been possible.

I'm glad I don't have to revise the section on ethics! It is clear that the students will not accept formal presentation any more than they will listen to orthodox sermons. The most effective teaching of ethics of which I have knowledge seems to be that based on discussion of the problems arising in the daily life of the students. Through search in the literature and elsewhere for solutions to specific problems, they will come to analyze problems, to develop judgment, to reach decisions and ultimately to act upon them, and in time will come to have a serviceable code and an inner standard of conduct.

In the last few years it has several times fallen to my lot to give the lecture outlined in the curriculum of our national nursing organization. I am glad to do anything I can to help any school. The directors of them need all the support that can be given them in meeting their ever-increasing and demanding problems. But when I face a class that is nearing graduation and is hearing from me for the first time, and in *one* lecture, "all about the national nursing organizations," I know that they will have little enthusiasm for that vastly important phase of professional life. When I go to a school which has sent a student representative to state and national meetings, the story is an entirely different one.

Schools have an unwritten curriculum which has a profound influence on this matter of character formation. I wish you might every

one have heard Miss Eldridge's masterly discussion of it at the Buffalo meeting of the American Hospital Association. That curriculum has to do with that intangible thing called atmosphere of an institution, and it is pleasant to recall of some institution where students are daily learning courtesy, truthfulness, kindness, generosity, and courage from the personnel of the staff and the administrative group as well as from the faculty of the school. Miss Eldridge brought out the point that many of the nurses who are charged with being commercial are so because they learned it in hospitals where distinction is made in the care of paying and free patients and where recording of a dose or a dressing was important because it was to be charged for. The student should have no concern with the question of who pays and who does not pay!

I have already spoken of the importance of recreation in relation to character formation, for we can no longer confine our interest in the off-duty time to the things the students can *not* do.

When all is said, What is our aim in schools of nursing? Is it not that of producing the socially efficient nurse? The nurse who practices her art happily because she derives satisfaction from her acquired skill; the nurse who sees beyond the patient in the bed to that individual as an important unit in his own group; the type of a nurse who, instead of telling you that she has spent six weeks on a rest-cure case, believes that she has spent six weeks in rehabilitating a family.

Are we producing that kind of nurses? Most assuredly we are. They practice their profession so skillfully that they are little talked about, but they have a way of moving steadily along their chosen paths. These nurses require no external yardstick of character measurement, for they are in constant competition with themselves, and therefore constantly and wholesomely growing.

If you ask if we are graduating as many of these desirable nurses as we need, I must answer, "No"; but it is well here to recall Brown-ing's line:

Man's reach must exceed his grasp or what's Heaven for?

To return to the subject of this paper, "The Spirit of Nursing," I beg to affirm my belief, based on observation of nurses from coast to coast, that the true spirit of nursing is neither dead or dying. It is the thing that is keeping you women of the League in schools in face of many discouragements; it is the thing that is making American nursing known and emulated around the world; it is the thing that has brought us together to-day for mutual helpfulness and because of our pride in our profession as represented by its organization; it is the thing that will keep many of us going to the end, because we well know that no other life offers the true nurse such lasting rewards.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,
U. S. Naval Medical Bulletin,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

WILLIAM CRAWFORD GORGAS, HIS LIFE AND WORK, by *Marie D. Gorgas and Burton J. Hendrick*. Lea and Febiger, Philadelphia, 1925.

This delightful narrative of the life of one whose name will always live as that of a great medical administrator and conqueror of epidemics, begins with his tour of duty at Fort Brown, Tex., in 1882. It was there that two events occurred which had a marked effect upon his later life. He met the lady who became his wife, and contracted yellow fever. Fortunately, he recovered and thus became immune, so that he was particularly well suited to carry on his remarkable campaign against that disease in Habana and elsewhere in later years.

In the chapter devoted to "Ancestry and Youth" we are told that the sole ambition of the young Gorgas was for an Army career, and that it was only after he failed in his efforts to secure an appointment to West Point that he decided upon the study of medicine. This was done with a view to entering the Medical Department of the Army, rather than from any love of the profession itself. Events proved how fortunate it was for Gorgas and for the world that his first ambition was not realized.

In 1879 Gorgas received his degree in medicine from Bellevue, and in 1880 he entered the Army as a medical officer. Two years later he became "an immune" to yellow fever. After this he was usually ordered wherever this disease appeared. Little of importance occurred until 1898, when he became chief sanitary officer of Habana, at that time one of the chief centers from which yellow fever spread to the rest of the susceptible world. It was his duty to stamp out the disease, but, like everyone else, he was entirely ignorant of its method of transmission.

Dr. Carlos J. Finlay had, in 1881, read a paper in which he asserted that yellow fever was transmitted by the *Stegomyia* mosquito. Unfortunately, Finlay had been unable to prove the truth of his assertion, and Gorgas, with the rest of the world, considered his theory but a myth. It remained for the commission headed by Walter Reed to demonstrate to the world in 1900 the truth of Finlay's theory and thus make possible the eradication of yellow fever from Habana. Finlay, Reed, Carroll, Agramonte, and Lazear experimented and Gorgas applied the knowledge gained by them. There is sufficient credit for all, and it detracts not at all from the glory of Gorgas that his part lay in applying the facts proved by others.

The story of Gorgas's fight against the mosquito in Habana is interestingly told. His engaging personality was of great value in placating the angry householders whose privacy was so often interrupted by inspectors in search of hidden water and his persistence in his search finally led to triumph. Gorgas began his work in March, 1901. After that time, the deaths from yellow fever were just five until the year 1905, when an epidemic occurred only to be wiped out promptly by the application of the methods devised by Gorgas. Since then yellow fever has been unknown in Habana.

The success of Gorgas in Habana made it inevitable that he should be selected to supervise the sanitation of the Canal Zone when it was finally decided, in 1904, that the United States would attempt to build the Panama Canal after the French had failed so disastrously in the same undertaking. Gorgas saw even more clearly than others that the French failure was due to disease, and felt that, with the experience gained in Cuba, he would be able to rid the Isthmus of its terrors for white men and thereby render possible the accomplishment of the gigantic task about to be undertaken.

The story of the conquest of disease in Panama is such a recent one that it does not require repeating. Suffice it to say that the account given is interesting and vivid and its reading will repay anyone interested in sanitation or who has a feeling of pride in the achievements of his fellow countrymen. The struggle of Gorgas, almost single-handed, against the ignorant prejudice of those in authority who would or could not believe in the value of his work; his success in ridding Panama of yellow fever in six months' time; the many efforts made by the commissioners to supplant Gorgas because he was a failure (?); the recommendation of the commissioners that all who believed in the mosquito transmission theory should be removed; how President Roosevelt, acting upon the advice of Dr. Alexander Lambert, threw his tremendous influence to Gorgas and thus saved the situation, are all entertainingly told.

The stamping out, to a large extent, of malaria in Panama offered far greater obstacles than did ridding the country of yellow fever. How Gorgas met the problem is described in detail. All know the success that crowned his efforts.

The remainder of the book deals with the work done by Gorgas in South Africa where he succeeded in reducing to normal proportions the incidence of pneumonia among the negro workers in the mines; his work as Surgeon General of the Army during the World War; and his illness and death in London when he was on his way to West Africa to investigate conditions in that disease-ridden section of the world. The high honors paid him by the British both before and after his death formed a fitting climax to the career of this distinguished member of the medical profession who had done so much to rid the world of a large measure of unnecessary sickness and suffering. His career, as told in this book, should prove an inspiration to all medical men and, particularly, to those in the Army and Navy.

THE TECHNIC OF LOCAL ANESTHESIA, by *Arthur E. Hertzler, A. M., M. D., Ph. D., LL. D., F. A. C. S., Professor of Surgery in the University of Kansas.*
Third edition. C. V. Mosby Co., St. Louis, 1925

To the reviewer, the chief interest centers not in this book but in the author, known to him only by his writings. In 1919 his two volumes on *The Peritoneum* appeared, written in a characteristic style so vivid that it proved to be a pleasure to read every one of the 830 pages. In 1921 came his equally valuable two volumes on *Clinical Surgery by Case Histories*. In 1922 his *Diseases of the Thyroid Gland* appeared, and now we have the third edition of his book on *Local Anesthesia*. Each one of these is a comprehensive work involving a great amount of investigation, practical work, and editorial labor. In addition, he has produced a large number of papers of the same high quality in the periodical literature, indicating a wide field of interest and professional activity. One wonders that a single brain and hand could be so productive.

The present book is a distinct addition to the literature of local anesthesia. The increase in use of this method has been so rapid in this country during the last few years that there has not been time for it to crystallize, and no one book is a complete epitome of the subject. One who undertakes seriously to perfect himself in the technic needs to consult the works of Braun, Farr, Labat, and Hertzler and will probably adopt certain things from each for his own use.

Hertzler's book is very practical. In presenting the indications for the use of local anesthesia he states that it is not a stunt to be performed but it is to be selected only in so far as it is best for the patient. It is the proper selection of method that marks the skilled

surgeon. The reviewer, who does nearly all his work with local anesthesia, believes this to be a very sane point of view since the interests of the patient are of greater importance than the development of any method.

This book will be of value wherever surgery is done.

TUMORS OF THE SPINAL CORD and the Symptoms of Irritation and Compression of the Spinal Cord and Nerve Roots; Pathology, Symptomatology, Diagnosis, and Treatment, by *Charles A. Elsberg, M. D., Professor of Neurological Surgery, Columbia University; Consultant in Neurological Surgery, Presbyterian Hospital; Attending Surgeon, Mount Sinai Hospital and Neurological Institute, New York City.* Paul B. Hoeber (Inc.), New York, 1925

A monograph based upon 100 verified tumors of the spinal cord that the author personally studied and operated upon. When so few physicians ever see a case of spinal-cord tumor and recognize it, to see a hundred cases must be one of the rarest of human experiences. It qualifies the author to speak with unusual authority.

Eighty-one cases are given in detail with discussion of symptoms and treatment. The errors in the early cases are frankly acknowledged, and it is most interesting to observe how the author's willingness to admit his failures and mistakes has aided in the gradual development of knowledge in this field.

Special emphasis is given to the general medical and neurological aspects of spinal-cord tumors, but the indications for treatment and essential details of the surgical treatment are also very completely covered.

The chapter on results and prognosis shows the improvement in mortality statistics during recent years and indicates the amount of postoperative improvement that may be expected in different cases. The outlook is still gloomy, but with earlier recognition and treatment it may be expected to improve. This book should be an important factor in such improvement, since it throws so much light on an obscure subject.

There is hardly a single specialty within whose realm a spinal-cord tumor may not mimic some common condition. The neurologists, internists, orthopedists, genitourinary, and abdominal surgeons have all contributed cases to this collection, and to all of these the book should be a guide to help them avoid errors of diagnosis.

PRINCIPLES OF PSYCHOTHERAPY, by *Dr. Pierre Janet, Member of the Institute, Professor of the College of France.* Translated by *H. M. and E. R. Guthrie*

This well-written and well-translated volume is divided into three parts. The first part summarizes briefly the evolution of the various methods of mental treatment, including the therapies derived from religious practices and psychophysiological treatments. An interesting account is given of the part which miracles and animal mag-

netism played in prescientific medicine; also the origin and spread of "Christian Science," the "Emmanuel," and "New Thought" movements. Doctor Janet states that these latter movements all grew out of the ideas on moral treatment of a Mr. P. P. Quimby, an able and observing former watchmaker, for whom Mrs. Mary Baker Eddy had served for some time as secretary. After his sudden death she carried off his manuscripts, wishing to monopolize them for herself.

The author asserts that Doctor Freud has attempted to transform in an original fashion the conceptions of psychological analysis concerning traumatic memories and the subconscious by generalizing them beyond all reason. He is of opinion that Freudian psychology, with its widespread sexual interpretation of nervous disorders, and even mental diseases, such as dementia precox, will meet with undeserved appreciation and then decline, but that, like magnetism and hypnotism, it will have played a great rôle and will have given a useful impulse to the study of psychology.

The second part of the book presents a study of psychological phenomena and the laws on which these methods are based. The author repeatedly compares the neurotic patient to an individual whose bank account has become exhausted. The neurologist should assist him in balancing his budget, so that he may be enabled to live within his psychic and nervous resources, practice economies in the same, and build up psychic income. Ways and means are discussed as to how these things may be done.

The third part of the book indicates the conditions under which psychotherapeutic measures can be applied with chances of success. Doctor Janet asserts that nothing can be affirmed in advance regarding a particular case, but that in a general way the principles of psychotherapy seem to be efficacious, and that there are a certain number of cures that can be legitimately ascribed to them. "One finds himself confronted by an application of the law of averages, and the efficacy of these treatments seems to depend on chance."

The volume as a whole presents very well the principles of psychotherapy and the conditions under which they are apt to prove useful. The well-known author is logical in drawing his conclusions; he does not indulge in extravagant language in presenting the merits of unproved theories or fragile hypotheses. He gives ample credit to the worth-while work of others and does not condemn without good reason. His book should prove to be a valuable addition to the library of the alienist or neurologist, who will find in it much that he can practice to good advantage in understanding and treating his neurotic patients.

HEREDITY IN NERVOUS AND MENTAL DISEASE, a Report of the Papers and Discussions of the Meeting of the Association for Research in Nervous and Mental Disease, New York City, December 27 and 28, 1923. Paul B. Hoeber (Inc.), New York, 1925

This book covers most of our present-day knowledge of the subject under discussion and will be found very interesting and instructive by physicians in general and by neurologists and psychiatrists in particular. It is arranged in logical sequence, although there is, necessarily, some overlapping of subjects. In general there is no attempt made to reach definite conclusions, but reading the book is stimulating to further thought and investigation. An extensive bibliography is appended for those who wish to make a thorough study of the literature.

The first chapter is devoted to general considerations and contains papers by such well-known authorities as Timme, Dana, Metz, and Barker.

In the second chapter Jelliffe presents a scholarly paper on "The Parts of the Central Nervous System Which Tend to Exhibit Morbid Recessive or Dominant Characters."

The third chapter deals principally with the pathological changes which occur in the bodies of those suffering from hereditary and familial diseases of the nervous system.

The fourth chapter presents the subject of the mental phases of these same conditions, while the fifth chapter is made up of an article by Joseph Collins on "Heredity in Fictional Literature." He concludes that, as fiction has hundreds of readers where biology has one, it is of advantage to the world that the facts of heredity be given by novelists and that those who consider the subject should inform themselves of the truth of these facts.

CLINICAL MEDICINE FOR NURSES, by *Paul Ringer, M. D., Chief on the Medical Service of Asheville Mission Hospital, Asheville, N. C.; on Staff of Baltimore Hospital, Baltimore, N. C.* F. A. Davis Co., Philadelphia, 1925.

This little book on Clinical Medicine for Nurses, written by Doctor Ringer, consists of 34 chapters dealing with the important symptoms of the prevalent diseases which a student nurse encounters during her stay in the hospital. The subject material is much condensed, yet clear and easily understood, the emphasis being placed on symptoms, their detection, meaning, and complications. The physical signs have not been dealt with. It is felt that the nurse should have some knowledge of these in order to give her a better understanding of the diseases. Knowledge stimulates interest.

Chapter I deals with fever as an important symptom, but gives nothing on pulse or respiration except the ratio between the height of temperature and the pulse rate. As pulse and respiration are

so closely correlated with fever it seems that something on this subject is necessary.

The book fulfills its mission in presenting the important diseases to the student in an acceptable manner. It is brief, comprehensive, and practical, but does not give sufficient information or material to be used as a reference book for the Hospital Corps of the Navy, as many of the diseases which we encounter in our worldwide experience in the Navy are not mentioned.

ORGANIC MEDICAMENTS AND THEIR PREPARATION, by *Ernest Fourneau*, Head of the Laboratory for Therapeutical Chemistry in the Pasteur Institute; Member of the Academy of Medicine. Authorized translation by *W. A. Silvester*, M. Sc. (Sheffield), Chemist with the British Dyestuffs Corporation, Ltd. P. Blakiston's Son & Co., Philadelphia, 1925

This volume comprises a translation of the lectures delivered by M. Fourneau in Madrid in 1917, together with a description of the practical work done by him at that time. Part I is descriptive and gives in detail the chemical formulas of all the well-known organic medicaments, including the arsenicals, hypnotics, autipyretics, local anesthetics and antiseptics, and something of their pharmacological action. Part II is practical. It gives a description of the apparatus used in the laboratory, gives advice to beginners, as well as explicit directions for carrying out every step involved in the preparation of the drugs. The book will not appeal to the average medical reader, but will prove of real value to the student of drugs as well as to manufacturers and pharmacists.

PERNICIOUS ANÆMIA AND APLASTIC ANÆMIA, by *Arthur Sheard*, M. D. Wm. Wood & Co., New York, 1925

A thesis presented for the degree of Doctor of Medicine in the University of Leeds, December, 1923, bringing together in concise form the history of these forms of anæmia, explaining the significance of the chief clinical and pathological features, and giving a definite basis for the differential diagnosis of the two conditions. The presence of the glossitis, achlorhydria, nervous disturbance, and high color index in pernicious anæmia is contrasted with their absence in aplastic anæmia. The author believes that no case with free HCl in the stomach contents should be considered true pernicious anæmia. Pernicious anæmia is classed as hemolytic while aplastic anæmia is nonhemolytic. No definite proof of a relationship between these two forms of anæmia has been found. Complete case reports of 15 cases of pernicious anæmia, 1 of aplastic anæmia, and 1 of hemolytic jaundice are given. A close perusal of this monograph will repay the student of the anæmias.

DISEASES OF THE RECTUM AND PELVIC COLON, by *Martin L. Bodkin, M. D., F. A. C. S., Rectal Surgeon, St. Catherine's Hospital; Associated Surgeon, Broad Street Hospital, New York.* Second edition, revised and enlarged. E. B. Treat & Co., New York, 1925

The author states it as his purpose to condense the results of his practice and the labors of other specialists in this branch of medicine into a book which covers the entire field in the most practical and comprehensive manner.

It is a natural corollary of this statement that no subject is treated in great detail unless the author has a special interest in it. Having this limitation in mind, it is a good book. The chapter on hemorrhoids is very practical, giving clearly the details of the commoner operations.

ALLEN'S COMMERCIAL ORGANIC ANALYSIS, Volume III, edited by *Samuel S. Sadtler, S. B., Elbert C. Lathrop, A. B., Ph. D., and C. Alnsworth Mitchell, M. A., F. I. C.* Fifth edition. P. Blakiston's Son & Co., Philadelphia, 1925

Hydrocarbons, bitumens, naphthalene and its derivatives, anthracene and its associates, phenols, aromatic acids, gallic acid and its allies, phthalic acid and the phthaleins, and modern explosives are considered in this volume.

This work impresses the reader by the very definite and detailed manner in which the subjects are treated. The analytical methods have been gathered from authoritative sources and are concisely described. This new edition will prove to be a useful reference book for the pharmaceutical chemist, as well as for chemists engaged in other lines of industry.

AMERICAN RED CROSS ABRIDGED TEXTBOOK ON FIRST AID, by *Charles Lynch, Colonel, Medical Corps, United States Army.* Third editions. P. Blakiston's Son & Co., Philadelphia, 1925.

The Manual of Instruction on First Aid prepared for the American Red Cross by Col. Charles Lynch, Medical Corps, United States Army, has reached its third edition, an indication of successfully fulfilling its mission. Written clearly, in simple language, not only does it instruct the individual how to give emergency treatment but also how to prevent accidents. The work of the American Red Cross in conducting a campaign of training and educating the public is greatly to be commended and has already helped to reduce the number of accidents in the industrial world.

A COMPEND OF GYNECOLOGY, by *William Hughes Wells, M. D., Late Assistant Professor of Obstetrics in the Jefferson Medical College*, revised and enlarged by *William Benson Harer, M. D., Instructor in Obstetrics in the University of Pennsylvania.* Fifth edition. P. Blakiston's Son & Co., Philadelphia, 1925

The value of this one of Blakiston's Compendes to the medical student and to the practitioner who is occasionally called upon to

handle the simpler gynecological problems, is attested by its publication in a fifth edition. This revision includes the newer methods of treatment, modern tests for sterility, and gives a clear description of the various operative measures employed by gynecologists. Its purpose, "to summarize the principal methods of gynecology," is well accomplished.

A COMPEND OF GENITO-URINARY DISEASES AND SYPHILIS, by *Charles S. Hirsch, M. D., Urologist to the Jewish Hospital, Philadelphia, etc.* Fourth edition, revised. P. Blakiston's Son & Co., Philadelphia, 1925

The author has succeeded in condensing into one small volume the essential facts of present-day knowledge in these broad fields. Urethral infections and neurosyphilis are especially well discussed and the use of modern tests and treatment in these conditions is clearly described. For students, a useful compend.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

COMMENT ON CERTAIN FEATURES OF MEDICAL PROPHYLAXIS AS APPLIED AT PRESENT FOR THE PREVENTION OF VENEREAL DISEASES IN THE NAVY

Study of monthly reports of venereal diseases (Form A) received from ships and stations in recent months tends to make the reviewer wonder how many naval organizations are failing to secure the results that might reasonably be expected from the efficient administration of chemical prophylaxis.

In the first place, it is surprising to note, very few reports indicate that any considerable number of men availed themselves of prophylactic treatment during the month. Why should that be? The medical officer of the average organization would probably reply, "Tubes are given to the men, and it is obviously impossible to tell whether or not the tubes were used." There is no question as to the validity of this conclusion. But is the medical officer who would dismiss the subject in this way disposed to think that he is really doing all that he should do in the way of making a practical and effective effort to prevent disease?

The preventive value of chemical disinfection for males when applied within a reasonable time after exposure has been thoroughly established. Reference to the annual report of the Surgeon General of the Navy for 1924 will make clear the attitude of the Bureau of Medicine and Surgery and reveal its desire to see medical prophylaxis applied in a really efficient manner throughout the service as promptly after exposure as circumstances will permit. It is indeed questionable if any great proportion of the total number of men exposed from month to month now avail themselves of prophylactic treatment, and in the cases where treatment is taken, either supervised or self-administered, it is doubtful how often the chemical agents are applied with desirable thoroughness.

A word about the prophylactic tube later; let us consider here the matter of supervised prophylaxis on board ship or at a naval

station. How many medical officers are there who really do not know whether prophylactic treatment is being administered efficiently in their organizations? How many have given adequate consideration to the various conditions and circumstances which tend to discourage the men from taking treatment after returning from liberty?

We know that circumstances frequently do arise to interfere with good intentions on the part of the men. Information on this point is not to be obtained by reading official reports, but rather by talking with the men themselves. Members of the hospital corps, chief petty officers, and men of lower ratings who have had experience and whose judgment is to be trusted are in a position to give some unexpected information regarding the reasons why more men do not avail themselves of prophylaxis.

For example, we have knowledge of conditions existing on board certain ships which anyone must admit would tend to discourage men from faithfully taking prophylactic treatment regularly and promptly after every exposure. In one ship, and this must have happened on board many others, the facilities for administering treatment were necessarily so limited as to the number of men who could be accommodated at one time in the venereal disease treatment room, used for the administration of prophylaxis, that a long line of men awaiting their turn would form after the return of a large liberty party late at night. When it is remembered that some of the men were under the influence of liquor and that many were physically tired and sleepy is it to be wondered at that a good many became impatient and turned in without taking treatment? What can be done under such circumstances is another matter. In some cases tubes can be used to good advantage. Authority may be obtained for making temporary use of additional space when large liberty parties are to be handled. Of course, the dock is the best place for prophylaxis when a first-aid station can be equipped there. The men will ordinarily be glad to submit to disinfection while waiting for their boats. One medical officer meets such situations on board his ship by putting additional hospital corpsmen on duty and directing that a sufficient number of syringes, jars filled with solution, and ointment containers be provided.

Another approved method of attending to an unusually large number of men returning from liberty in one party is to use prophylactic tubes instead of syringes and prepared solutions. The tube is believed to provide quite as effective means for disinfection as calomel ointment and the solutions ordinarily used. The question of primary importance is whether or not the materials are applied under the supervision of a trained and competent hospital corpsman. In general, it is hardly to be expected that the results of self-adminis-

tered treatment will compare favorably with the prophylactic effects of carefully supervised treatment. There is some advantage in employing the tubes under supervision, for the men may thus be instructed how to use them properly, and some may thus be induced to avail themselves of thorough disinfection after future contacts without waiting until they have returned to ship or station.

Of course, one can not rely upon statements made by the men that they have used tubes before returning from liberty. At least many of the men can not be trusted to tell the truth. Reports from the Asiatic Fleet and elsewhere indicate that by and large the only way to make prophylaxis generally effective is to require the men to admit exposure and take treatment under penalty of punishment for disobedience of orders.

It is obvious that a careful record of prophylaxis must be kept. To guard against assertions that treatment was taken at a specified time, but that the hospital corpsman failed to enter the name, it is well to require each man to sign the register after the necessary data regarding time and place of exposure, etc., have been entered. To make it impossible for men to have their names entered and dated back later in case manifestations of infection appear, a new sheet of paper for each day is better than a book. At the end of each day, the completed register, dated and signed by the hospital corpsman, should be turned in to the medical officer. This system also gives the medical officer a better idea of how many men are taking prophylactic treatment from day to day in correlation with the number of men going on liberty. Of course, if the records are kept in a book the book can be examined daily, but is it likely to be?

The tube undoubtedly has an important place in the scheme of prophylaxis. Many men will ask for tubes and will use them even if they know they will be required to submit to disinfection again after returning from liberty, not caring to run the risk of punishment in case they should become infected. On the other hand many men will throw the tubes away, if indeed they have not learned that they can be sold or exchanged in places of prostitution. The tubes are expensive. They should be given out with discretion, not handed out indiscriminately to all members of the liberty party without any assurance whatever that they will be used in case of exposure. Probably most of the men when they leave the ship or station do not expect to be exposed. Some know they will be and some hope for adventure. Whatever the psychology of the individual he should be made to understand that the tube costs money and that it is given to him for his own good with the hope of preventing disease and especially to save him from acquiring syphilis, the final consequences of which in most cases can not be foreseen. He should know that the ingredients in the tube have been determined upon by careful scien-

tific experiments and much expense. It is a real service that is made available to the men and they should not be led by the manner of handing out the tubes to feel that it is a perfunctory matter. All men who ask for tubes should have them. They should not be forced on other men. Of course, the more men who can be induced to ask for them through proper instruction the better.

The whole subject of venereal diseases among naval personnel is now being studied by a board of officers representing the Bureau of Navigation, the Office of the Judge Advocate General of the Navy, the Major General Commandant of Marines, and the Bureau of Medicine and Surgery. It is apparent that many of the activities which are necessary if the incidence of venereal disease in the Navy is to be appreciably reduced are not medical in character. So far as the question of medical prophylaxis is concerned, the general order now effective, G. O. 69, which relates to the prevention and control of venereal diseases, does not require compulsory prophylaxis. It is, however, within the discretion of every commanding officer to require the members of his command to report exposure and submit to disinfection and to award such punishment as he deems proper for disobedience of orders in case infection occurs without record of prophylaxis. This point is covered in a decision by the Judge Advocate General of the Navy, expressed in Court-Martial Order No. 9 of September 30, 1922. When General Order No. 29, superseded by General Order 69, was in force, it appeared that there was altogether too much variation in the manner in which it was carried out to make it effective in a large sense. So far as the bureau could judge, in many instances men were not punished for failure to take prophylaxis, as the order contemplated, in cases where failure to do so could be proved, and there was a great deal of variation in the nature of the punishment awarded. Sex behavior is, of course, a subject on which men have their own opinions, and commanding officers as well as medical officers react differently to the idea of punishing men, virtually for the misfortune of becoming infected, as they see it, if failure to take prophylactic treatment is regarded as the offense, while other men equally guilty escape punishment because they are lucky enough not to become infected and consequently are not detectable. If medical prophylaxis is to have maximum value, the requirements regarding it must be uniformly enforced. It is hoped that one result of the study now being made of the venereal disease problem will be a general order regulating among other measures the administration of prophylactic treatment by providing for uniform and necessary disciplinary measures looking toward the systematic enforcement of requirements.

With regard to the matter of instruction as bearing upon the readiness of the men to apply for prophylactic treatment, it is not intended here to discuss the question of how well or how completely such instruction is now being given. In any event educational endeavors will not be very successful unless an adequate attempt is first made to enlist the support of men of the better type among the crew. Unless organized efforts are made to create active interest in the crew to detect and suppress the activities of undesirable characters it is difficult to counteract their influence upon other men, especially upon the younger men, by any sort of instruction that can be given by the medical department.

The bureau has presumed that instruction regarding the nature and dangers of the venereal diseases and the importance of securing disinfection promptly in case of exposure has been carefully given to all recruits at naval training stations. However, an officer from the Bureau of Navigation, who is interested in this subject because he is also a member of the Navy Department Board referred to above, took occasion to look into this matter recently in connection with an inspection visit to one of the training stations. His impression was that such instruction was being given in a perfunctory manner that could not be expected to have much preventive value and that the medical officer was leaving altogether too much of the educational work to hospital corpsmen. Inasmuch as he looked into the matter with an open mind only for the purpose of forming an idea of what can be done to strengthen antivenereal disease measures it is probable that his impression was correct. And yet, we have reason to believe from talking with men familiar with conditions on board ship, that men for a short time after leaving the training station are careful to report for prophylactic treatment, indicating that they have at least had the importance of this measure impressed upon them, but that after a time, yielding to inertia, or guying, or the force of example set by the older men they get out of the habit and trust to luck that they will not become infected.

At present one might conclude from an examination of the venereal disease statistics of the Navy in conjunction with the figures for prophylaxis taken from monthly reports of venereal diseases that chemical disinfection as a means of prevention is quite worthless. Such a view would be very superficial and without the most elementary attempt at analysis. With insight into the situation one is forced to believe that in many instances prophylaxis in name only is being administered.

Careful studies made in the Navy in past years indicate that chemical agents really applied within a reasonable time after exposure will prevent infection in more than 50 per cent of the instances in which infection might be expected to develop without

prophylaxis. It is altogether probable that careful disinfection within one hour will prevent disease in upwards of 75 per cent of the cases that would otherwise occur. The public health world is gradually coming to appreciate this apart from considerations relating to the advisability of recommending medical prophylaxis as a public health measure to be sponsored by the State or community. This is shown by a resolution adopted by the Conference of Venereal Disease Control Officers of State Health Departments and the United States Public Health Service, held at Hot Springs, Ark., December 1 to 3, 1924, as follows: "And whereas experience has also shown that education and measures for the control of environment can be aided by the incorporation of measures for immediate disinfection of those exposed to these diseases, which measures have been proved to be scientific and practicable: *Be it resolved*, That greater efforts now be made by official and voluntary agencies to devise and demonstrate community procedures to this end, and be it resolved that a special committee be appointed to facilitate such efforts."

The venereal diseases are among the foremost of all diseases in causing damage to the Navy from all viewpoints, including admissions to the sick list, sick days, actual disability not accounted for in statistical returns, prolonged recorded disability, permanent disability, and deaths. Inasmuch as there is reason to believe that, by and large, medical prophylaxis in the service is not as effectively preventing venereal disease as it can be made to prevent by more universal employment and more careful application, it is hoped that medical officers will give this subject the critical study it deserves. We are constrained to believe that inquiry into the manner in which prophylaxis is supervised and the endeavor which is being made to induce men to avail themselves of disinfection, would in many instances bring to light ways and means of increasing the effectiveness of this preventive measure.

Doubtless facilities for coping with the problem in many ships are incomplete or too little space is available for expeditiously handling the number of men who must not infrequently be treated at one time. Review of the last annual sanitary reports submitted by ships shows that while many medical officers freely discussed various aspects of the venereal disease problem, the points under consideration here were scarcely mentioned. In other words, these reports are of little assistance in collecting data bearing on practical needs in the way of promoting and increasing the effectiveness of this outstanding method of endeavoring to prevent infection. The Bureau of Medicine and Surgery is not in a position to act without accurate knowledge of conditions as they exist throughout the service. During the year one medical officer recognized the handicap of having to provide

prophylaxis and administer treatment of gonorrhea in the venereal-disease treatment room of the battleship to which he was attached without a running supply of hot water, and he recommended that a hot-water heater and piping for fresh water be installed. The request was submitted to the department by the commanding officer. The Bureau of Medicine and Surgery was glad to take advantage of the opportunity to express its strong approval of the request. The Bureau of Construction and Repair gladly adopted the policy of providing all necessary facilities for applying the principles of concurrent disinfection in the management of the venereal diseases which are unquestionably communicable and dangerous to the public health. As a result of this recommendation all ships equipped with treatment rooms are to have a constant supply of fresh hot and cold water and a sink provided with knee operated and foot pedal control. Water, preferably warm water, and soap must necessarily constitute an important part of the disinfecting process just as in the preparation of the patient and the surgeon's hands before undertaking a surgical operation.

It may well be that concerted study and action by medical officers may bring to light some other conditions for which remedial action will be found practicable. At any rate medical officers should be glad to communicate the results of their observations and report to the bureau any improvements found practicable that may be interesting or useful to others.

As pointed out in a previous article dealing with the management of the venereal diseases it is primarily important to make the crew feel that the medical officer is interested in the prevention and in the treatment of these diseases. Without the confidence of the crew comparatively little headway can be made. Much can be accomplished by talking with the men. Not only is it helpful to learn their viewpoint, but the medical officer may in this way obtain an insight into conditions which ought to be corrected.

He may find that the personality of the hospital corpsman who has been assigned to supervise prophylaxis is responsible for the failure of many men to avail themselves of disinfection. This matter is so important that one of the brightest and best-trained pharmacist's mates should be placed in charge. It is true that such a man will not be contented with this job unless he is also given a responsible part in the treatment of the venereal diseases. To make his work interesting it is therefore desirable to require him to take the histories of cases, examine smear for gonococci, make preparations for dark-field examinations, record physical findings, and prepare patients for the passage of sounds or surgical procedures.

The medical officer may find that one reason why men have avoided taking prophylaxis has been that the solution of protargol

used has not been properly prepared and has caused much pain. The proper way to prepare the solution is to sprinkle the powder on the surface of distilled water and allow it to dissolve without stirring. If the mixture is stirred, grains of the silver salt are likely to remain undissolved, and these may cause great irritation in the urethra. Another point is that it will not pay to provide a stronger solution than the general run of men will use without complaint.

The medical officer may learn that after a few men have taken treatment conditions in the room become repulsive to the men following. Too few syringes have been provided, and some of those set out in the beginning have disappeared. The remaining syringes are covered with silvol or protargol solution. The floor is discolored and the urinal trough is smeared. Adequate facilities have not been provided for washing the hands, and the basin of disinfectant solution, clean to start with, is now regarded by the men as filthy. In some instances the men have felt that the syringes provided for prophylaxis have been used by men with active infection, or possibly so used without sterilization.

These are a few of the deterrent influences of which we have knowledge. More could be mentioned, but it is unnecessary, because no great effort is required on the part of the medical officer to learn what is wrong in his own organization. In spite of all that can be done in the way of providing facilities and requiring careful and competent supervision of prophylaxis, many men will not take treatment unless they are compelled to do so. Along with compulsion a serious endeavor should be made to induce men not to neglect disinfection. By all means they should be made to realize the importance of using the tubes promptly after exposure to reduce the liability of becoming infected with syphilis, because increasing knowledge indicates that this is a truly frightful disease, for which cure is most uncertain. This conclusion is justified when the most hopeful thing that could be agreed upon by the Hot Springs conference is as follows: "The conference urges that the indiscriminate use of the term 'cure' in the treatment of syphilis be checked and that in its stead the patient be accustomed to think of 'arrest' and to expect and seek observational control at appropriate intervals and under appropriate medical and consultant guidance throughout a period of years, if not for life." It is manifest that forceful endeavors to instruct and educate the men should not be neglected, but that is another matter to be dealt with in another article.

There are a good many other reasons besides those touched upon above why men fail to take prophylactic treatment promptly. Often intercourse takes place under conditions which make it difficult or

impossible to use a tube without returning to ship or station or finding a suitable place, such as a hotel or city railroad station with pay lavatories, where privacy can be had. Psychological reactions are difficult to combat. Most men will not apply disinfection until they have parted company with the woman in the case, either through embarrassment or disinclination to give offense. Many men will not realize that they can not with safety put their trust in a partner who asserts that she is free from disease. Many feel that inasmuch as they have been formally introduced by a mutual acquaintance it would be insulting to the lady in question to assume that prophylaxis is necessary. Then there is the most difficult of all psychological tendencies to overcome. That is the feeling of safety that comes with continued acquaintanceship and repeated intercourse with a young woman who is mistakenly believed not to be promiscuous in sex relations.

Whatever the difficulties imposed by these psychological complications, there is no reason why everything necessary should not be done to insure carefully supervised treatment for all who will admit upon returning from liberty that they have exposed themselves to possible infection.

It would seem unnecessary to define "exposure to possible infection," but we are aware of instances in which compulsory prophylaxis was explained to the crew with misdirected zeal or with such lack of judgment as to cause great resentment among married members of the command. Upon one occasion it appears that a commanding officer addressed part of a regiment of marines assembled to witness a ball game. There were women present, among them wives of enlisted men. Why it was decided to give a talk on the dangers of venereal disease upon such an occasion is unknown, but it seems that the commanding officer did take advantage of the assembly to warn the men against associations with native women, and in the course of his remarks touched upon the serious consequences of venereal disease and pointed out that prophylaxis after exposure was compulsory. The remarks which especially caused resentment were statements to the effect that it was impossible to know who could be trusted, the inference being that the married men should look upon intercourse with their wives as possibly exposing themselves to infection and that accordingly they should take precautions.

It is, of course, not to be assumed that men are likely to be infected by their wives. Once in a while, to be sure, a case does arise where the evidence indicates that the man has been infected by his wife. In such a case, with reasonable proof as to origin, the man would not be regarded as having acquired the disease as a result of misconduct on his part. It is true that some men in the Navy

have been known to enter into marriage relations fully aware of the fact that the woman in question was promiscuous in her sexual relations, and in a few instances a man has actually been caught procuring for his wife who has continued to practice prostitution. However, that does not alter the fact that the vast majority of married men in the service live up to high standards of conduct and bitterly resent any insinuation that moral standards are low in service families.

No one can go very deeply into the study of venereal-disease problems without realizing that some men and some women are capable of the vilest behavior, but the more extended the study the more optimistic and the more firmly convinced one becomes that a clear majority of the men in the Navy, as well as citizens in general, will support all reasonable measures planned to reduce the prevalence of venereal diseases. In the last analysis the success of any rational attack upon these diseases rests upon that assumption.

REPORT OF AN OUTBREAK OF BACILLARY DYSENTERY AT THE UNITED STATES NAVAL HOSPITAL, CANACAO, P. I.

By H. W. SMITH, Commander, Medical Corps, United States Navy

An outbreak of bacillary dysentery started February 26, 1925, and lasted until March 25, 1925, when the last case was discharged to duty. There were in all 19 cases, which developed as follows:

Date of onset:	Cases
February 26.....	1
February 27.....	2
February 28.....	6
March 1.....	2
March 2.....	3
March 3.....	2
March 4.....	0
March 5.....	1
March 10.....	1
March 11.....	0
March 12.....	1
Total	19

In tracing the source of infection only one article of food could be implicated; fresh sliced tomatoes served February 24, 1925. These tomatoes had been scalded three minutes in boiling water before peeling. It is assumed that some tomatoes remained uncovered and caused infection to be spread throughout the batch prepared. This was the only food of native origin not cooked served during the 10 days preceding the start of the epidemic. Water-borne infection was eliminated, as no cases developed outside of the general

mess of the hospital. All food handlers were examined immediately after the outset and no carriers could be detected, nor had there been any record of intestinal disease among the food handlers for a month prior to the epidemic. Bacteriological examination of stools, using various fermentable sugars, indicated that this epidemic was due to a strain of Flexner Y dysentery bacillus.

The cases varied from mild to moderately severe. All recovered; there were no serious complications. In all severe cases polyvalent antidysentery serum was administered. In cases where the serum was administered there followed a sharp anaphylactic reaction in from four to seven days following the administration of the serum, whether the serum was given subcutaneously or intravenously. Calcium lactate was given from the time the serum was administered without any discoverable prophylactic effect. Serum reactions were noted in 13 of the 14 cases in which it was administered. The reactions were more painful and produced more distressing symptoms than the actual attack of dysentery.

It is interesting to note that for the week ending February 28, 1925, the Philippine Health Service reported from all provinces 285 cases of dysentery with 204 deaths. It is realized that these figures do not represent the probable number of cases of dysentery in the islands, as cases are not registered unless the patient is very seriously ill, but they do show that the disease has a very high case fatality rate in improperly treated cases, and it is believed that the very successful outcome of the epidemic at this hospital was due greatly to the administration of the antidysentery serum and proper dietary regulations.

COMMENT REGARDING EPIDEMIOLOGICAL MATTERS FROM THE SANITARY REPORT OF THE UNITED STATES NAVAL STATION, OLONGAPO, P. I., FOR 1924

By THEODORE E. COX, Lieutenant, Medical Corps, United States Navy

Venereal diseases.—The venereal admission rate has been slightly lower for this year than the preceding year, six admissions for gonococcus infection of the urethra and three for chancroid being the total for the year. However, in only two of these cases did the infection originate in Olongapo, the remainder originating for the most part in Manila while the men were on leave or prior to arrival at this station. The control over prostitution, including compulsory treatment of infected cases and deportation of chronic offenders, afforded by naval reservation control, combined with ample opportunity offered the station personnel for healthful outdoor recreation by the golf course, tennis, swimming, hunting, etc., renders as excellent a

solution of the venereal problem as can be obtained on the Asiatic station.

Entamebic dysentery.—There were four cases of this disease admitted during the year. The first case being a marine private admitted June 30, 1924. This patient was received from Guam a few months previous, and the infection, in all probability, originated at that place. Following this admission there were three other cases, September 4, 7, and 9, respectively, the patients being the station medical officer, a marine officer, and a marine sergeant. The latter cases were all mild and responded readily to treatment, the cases being entered in the health record merely for record. In the absence of any definite epidemiological data reported on these cases at the time, the present medical officer is of the opinion that these cases may be regarded as originating from the first reported case.

Bacillary dysentery.—There was only one case of this disease admitted during the year, of mild type and yielding readily to treatment. The source of infection was not recorded, but with the absence of other cases among the personnel it is thought to have originated in exposure at one of the outlying barrios where the disease in mild form is more or less constantly present.

Malaria and dengue.—Thirty admissions for dengue during the year complete the infectious disease record for the station personnel. Dengue is practically endemic here, with occasional flare-ups to epidemic proportions incident upon increase in nonimmune personnel coincident with weather conditions favorable to mosquitoes. This disease is the principal source of sick days for the personnel of this station, but fortunately it is of mild and often atypical type and from the standpoint of treatment the disease is not difficult to manage. From the standpoint of prevention, dengue presents a much more difficult problem, as the topography of the locality renders mosquito control uncertain and expensive. However, preventive measures against mosquitoes are fairly effective as regards service personnel and comparative immunity against malaria is secured, no case having occurred during the last year. Malaria is prevalent among the native population of the reservation, but the majority of the cases are found in the outlying barrios where sanitary control is less complete. Even here the incidence is diminished by compulsory quinine treatment of patients and contacts, as well as by such antimosquito measures as it is possible to institute, such as flushing, cleaning drains, etc.

General considerations.—The epidemiological situation as regards the native population of the reservation, due to ignorance, lower economic plane, etc., is distinctly less favorable than for the service personnel. The same gradation holds true for the outlying barrios as contrasted with Olongapo proper. However, even then, the sani-

tary, hygienic, and epidemiological situation here is much better than similar conditions prevailing among the native towns surrounding the navy yard at Cavite. This is accounted for by the better sanitary and hygienic control afforded by naval reservation regulations, coupled with daily sanitary inspections by hospital corpsmen and the medical officer.

During the past year there was a slight epidemic of measles and whooping cough among the native children, with a few deaths resulting. The outbreak was fairly well limited by efforts at early diagnosis, quarantine, and inspection of school children with exclusion of all suspects and contacts. A few cases of typhoid fever have been treated among the natives, but these originated either at Manila or in neighboring provincial towns where this disease is more or less epidemic. Mild bacillary dysentery of the Flexner type, and scattered cases of malaria have been seen from time to time, mostly in the outlying barrios. No case of cholera or small-pox has occurred on the station during the last year.

With the progressive transfer of activities to Cavite the economic condition of the native population has been lowered during the last year and increasing difficulty has been met in enforcing and encouraging better sanitary and hygienic standards. The standard of living has also been lowered and the mortality of infants and children has increased, infantile beri-beri and malnutrition being the main causes of death. The greater proportion of the children, as well as a large number of adults, are infected with ascaris with a smaller percentage showing hookworm. The average native child coming under observation for treatment is found to be suffering from an acute infectious process with beri-beri and intestinal parasites as complicating factors. This complex, coupled with the tendency to call for medical advice only as a last resort and frequent failure on the part of the parents to carry out the treatment prescribed because of superstition, prejudice, and low mentality, renders successful treatment a difficult problem, indeed.

However, during the last year, in cooperation with the provincial health authorities, a systematic campaign of cowpox vaccination was carried on among the natives and the major part of the population can be considered as protected from smallpox at the present time. In view of the prevalence of typhoid fever in Manila and the neighboring provinces quite a large number of typhoid inoculations have also been administered. A persistent campaign is also being waged against beri-beri by the medical officer and the native nurse at the town hospital, as well as by constant lecturing on the part of the clergy and school-teachers as to the dangers of the use of polished rice. It is surprising with what tenacity the average native clings to the use of polished rice despite all advice and warning, and, as a

rule, the change to unpolished rice is not made until a death among the children in the family has resulted. The same attitude, despite many years of association with modern medical and surgical treatment, offered at the town hospital, is manifested toward operative and medical treatment in general. Many times operative measures are refused, and the vast majority of cases applying for medical or surgical treatment are far advanced.

Water supply.—The source of water continues the same as in previous years and no case of infection has been traced to it during the year. The watershed, reservoir, and piping are under constant supervision with frequent bacteriological examinations of the water. Distilled water is furnished the service personnel daily, but the native population of the reservation uses the regular water with no apparent infection resulting therefrom.

Food.—The Navy personnel, excepting hospital corpsmen, is given a money ration, which is spent by the men in local restaurants. These restaurants are inspected frequently and have been found constantly to be in good sanitary condition, no cases of infection or of food poisoning arising from this source during the last year. The Marine Corps ration is satisfactory as to quantity and quality and preparation, although the variety is somewhat limited at times, owing to the isolation and infrequency of ferry service. This defect is most noticeable in the typhoon season.

Cost of medical service.—Medical, surgical, and dental supplies are adequate although it is recommended that Mercurochrome-220 be added to the Supply Table. The great variety of uses that this preparation may be put to in tropical practice renders it a valuable addition. In view of the unsatisfactory results experienced in transmitting sera to the naval hospital at Canacao for Wassermann reactions, the Kahn precipitation test coupled with dark field examinations is being instituted.

In connection with the subject of supplies, attention is invited to the high "average cost per diem" for care of service personnel at this station, as shown on the quarterly report of Medical Department Receipts and Expenditures (Form NMS-E), for the quarter ending December 31, 1924, showing this as \$0.1109, and also as shown in the Surgeon General's annual report for the fiscal year 1924, where the average cost per diem for the fiscal year is reported as being \$0.12639. This apparently excessive cost is accounted for in great part by the many additional demands met by the dispensary in extending medical and surgical treatment to the families of service personnel, treatment of emergency cases transferred from naval vessels, examination and treatment of injuries of yard employees, emergency surgical treatment of practically the entire native population of the reservation, with medical treatment extended in many

cases for humanitarian reasons, and prophylactic distribution of quinine as a preventive measure against malaria. The cost of civilian labor, necessitated mainly by these more or less extraneous demands, also represents a large factor in the increased cost. In contrast, the expenditures really involved in caring for the small and comparatively healthy personnel of the station form but a very minor portion of the total amount charged entirely against this personnel. Thus, it is quite evident that the figures as reported can be regarded as of little, if any, statistical value. It would seem a more equitable arrangement if some apportionment of these charges could be arranged, although an absolutely accurate subdivision would be somewhat impracticable and quite difficult. However, a rough approximation, such as charging one-third against naval reservation demands, one-third against dispensary care of dependents, yard activities, etc., and one-third against service personnel, would more nearly indicate the average cost per diem and make statistics under this heading more valuable for purposes of comparison.

**THREE CASES OF SCARLET FEVER, REGARDED AS MILK BORNE,
REPORTED FROM THE MARINE BARRACKS AT QUANTICO, VA.**

Three patients ill with scarlet fever reported from widely separated organizations in a period of time consistent with exposure to infection at or about the same time. These men had not been in contact with each other or with any previous focus of infection on the station. They had not been away from the Post during possible maximum incubation periods. Attention was consequently directed to milk as a possible source of infection.

The principal supply of milk was eliminated from suspicion. The possibility that milk handled by food-vending establishments in the village of Quantico might be at fault was then considered. Milk from a dairy near Occoquan was being delivered to four restaurants, where it was sold raw. Samples of that milk was obtained and found to yield numerous colonies of hemolytic streptococci.

The last of the three above-mentioned patients stated that on the evening of February 5 he had drunk milk in one of the four restaurants. That particular restaurant received milk exclusively from the suspected dairy. The patient developed scarlet fever four days later.

The proprietors of the restaurants in the village were informed that the military authorities regarded that supply of milk as unsafe. The dairyman was likewise notified, and the State commissioner of health was advised by letter. The sale of that milk was discontinued in Quantico.

LABORATORY PROCEDURES NOW EMPLOYED BY THE HEALTH DEPARTMENT OF NEW YORK CITY IN CONNECTION WITH THE PREVENTION AND CONTROL OF TYPHOID FEVER

The following information is taken from an article by Charles Krumwiede, M. D., Bureau of Laboratories, entitled "The Routine Activities of the Bureau of Laboratories of the Department of Health in Relation to Typhoid Fever," published by the Department of Health, city of New York, in its monthly bulletin for January, 1925:

"Diagnostic procedures.—The laboratory diagnostic procedures applicable in typhoid fever are: (a) serological and (b) cultural. For the demonstration of antibody response on the part of a typhoid-infected individual the agglutination test (the Gruber-Widal Reaction) is most expedient and is usually employed. The cultural methods include blood cultures, urine cultures, and feces cultures. The department of health offers the Widal Test, the necessary supplies for which are available in all culture stations. Fecal specimens for bacteriological examination may also be submitted.

"The Laboratory has developed special procedures for the examination of feces. Blood-culture examinations have not been offered because of technical difficulties, the expense entailed in covering the large territory of the city, and because no demand for this mode of diagnosis has developed."

"There are certain points as regards laboratory verification or diagnosis that require comment. Previous vaccination may seriously interfere with the application of the Widal reaction. After vaccination, the Widal reaction may remain positive for six months to a year, or in some instances even longer. It has been suggested that if there is a suspicion of typhoid fever, that the agglutinin titre be tested several days apart, to determine whether there is any marked change, especially a sharp rise. The agglutinin titre, after a vaccination done some time previously, remains relatively constant, and any sharp change indicates present infection. This procedure is not altogether reliable, as there is reason to believe that an infection, other than by one of the bacilli of the enteric group, may cause fluctuations in the titre of previously vaccinated individuals.

"We receive, not infrequently, reports of the existence of paratyphoid fever, in cases in which the diagnoses are rendered extremely doubtful, if not excluded, by our finding of *B. typhosus* in stools submitted for discharge examination. Such diagnoses may be based either on the failure to obtain a positive Widal reaction or on the fact that one of the paratyphoid bacilli is agglutinated by the patient's blood in higher dilutions than the *B. typhosus* is. This mode of differential diagnosis is not a reliable one. The apparently paradoxical higher agglutination of one of the paratyphoid types is due to group reaction, which may be accentuated by greater sensi-

tiveness to the agglutinin action of the paratyphoid culture in question. In fact, there is no completely reliable mode of differential diagnosis, other than a cultural examination, preferably the blood culture. It might be noted that the data available indicate that blood cultures may be positive more frequently later in paratyphoid fever than is the case in typhoid fever. Localization of the bacilli is more marked in typhoid fever and presumably this is a factor. It has been observed in the case of other types of bacteriaemia that localization is not infrequently associated with a clearing of the blood.

"Fecal examination of convalescent cases.—The discharge from quarantine is under the supervision of the Bureau of Preventable Diseases. No case is discharged until two negative examinations are made. Even after two such negative examinations the above Bureau demands a further examination after intervals of two and six months. Persons who are engaged in a food-handling industry are examined frequently during the period of six months after convalescence. No examinations are made prior to ten days after defervescence.

"We employ a special medium devised at the Laboratory. This medium contains a differential restraining substance, brilliant green, which inhibits many of the fecal bacteria, but does not interfere with the growth of *B. typhosus* or *B. paratyphosus*. Thus we are able to inoculate much larger amounts of material than could be inoculated on the other media usually employed. The chances of finding *B. typhosus*, therefore, are increased very materially. Brilliant green is easily influenced by extraneous factors, and a careful balance must be struck by preliminary trials, with positive and negative materials. Each day's work serves as a further control on this balance. Evidently a laboratory which does not have access to positive stools, is not in a position to reach the maximum degree of success with this medium.

"The procedure which allows us to report the results of fecal examination the morning after receipt of a specimen is as follows: We are able because of our facilities to prepare agglutinating serums for *B. typhosus* and *B. paratyphosus*, not only in large amounts, but also of the highest possible strength or titre. These very high titre serums are then stored in the refrigerator, this storage resulting in slow deterioration. This deterioration is more rapid, as regards the common reacting substances in the serum. Consequently, we have serums which are highly specific for their homologous bacterium, and still of very great strength, even though some loss has occurred. An appropriate dilution is determined for slide agglutination tests, and this dilution is then used to verify the presence of *B. typhosus* on the culture plates, or similarly with the appropriate serums, to identify the *B. paratyphosus* varieties.

"Assume that we are searching for *B. typhosus*; the method is as follows: Drops of the diluted antityphoid serum are placed on a glass slide, and likewise drops of saline as controls. The plate cultures are examined, and if colonies resembling those of *B. typhosus* are present a portion is taken up with a loop. This bacterial mass is rubbed first in the drop of saline solution till slightly milky, and then similarly in the drop of serum. If it is a colony of *B. typhosus* agglutination clumping will appear almost immediately in the serum drop, whereas the saline drop will remain uniformly cloudy.

"This reaction when it occurs is so distinctive in the great majority of instances and is so reliable that reports are made on this test alone in all discharge examination work. Where, however, positive findings are to be used to brand an individual as a chronic carrier, complete verification tests are carried out to eliminate any possible question as to the findings.

"This simple slide agglutination method permits rapid examination of a large number of suspected colonies and is an added factor in the high percentage of positive results we obtain.

"*Suspected carriers.*—In examinations of food handlers, as a basis for their occupation card, a special effort is to be made to determine whether the applicant may be suspected of having had typhoid fever. There are several points as regards the carrier problem, which might be emphasized again. The excretion of typhoid bacilli in the stool may be irregular, so that two successive or even many successive negative bacteriological examinations may be followed by positive findings. This fact is taken into consideration in departmental procedures. It underlies the convalescent discharge procedure as applied to food handlers. It also explains the request for further examinations two and six months after convalescence in other cases. That these late examinations are of value is shown by the fact that about 1% of those primarily released on two negative examinations are found positive on the later tests.

"The possibility of remissions is also taken into consideration in the examination of suspected carriers. At least two negative examinations are requested, and the Widal reaction may be done as well. If the suspicion is very strong, more fecal examinations, or even duodenal cultures may be found desirable, to clear an individual of suspicion. If recent disease or vaccination is not a factor, the Widal test has considerable value in the search for carriers. About 65% to 75% will give a positive reaction. The presence of a definite reaction, with negative bacteriological examinations, speaks strongly in favor of a carrier with an intermission. A negative reaction, however, has little exclusive value.

"Because of the simplicity of the Widal test it is frequently employed as a preliminary means of testing a large number of indi-

viduals, to select those to be examined bacteriologically. It is evident that this procedure is not altogether reliable. Its value, however, can be somewhat increased by testing the blood in lower dilutions and by incubating the tests for a longer time than is ordinarily done in applying the Widal test for diagnostic purposes. This method results in casting suspicion upon anyone possessing any appreciable content of agglutinins in the blood. Such an agglutinin content will naturally be within the range of 'normal' content of those who never have had a typhoid infection.

"Prophylactic vaccines.—The Laboratory is ready to furnish Typhoid Vaccine, a Typhoid-Paratyphoid (Triple) Vaccine, and a Paratyphoid Vaccine.

"The armies of the United States and of other countries have found it desirable to use the typhoid-paratyphoid vaccine. Because of this the idea has become generally prevalent that the combined vaccine is equally desirable for the civil population. This is not the case. There are three facts to be considered in selecting the typhoid-paratyphoid vaccine in preference to the typhoid vaccine: 1. The question whether the patient is likely to be exposed to paratyphoid infection must be considered. 2. That paratyphoid fever is a less severe form of infection. 3. That the combined vaccine gives more frequent and more severe reaction than does the typhoid vaccine.

"There is very little paratyphoid fever in New York City, in fact, far less than physicians' diagnoses indicate, as already noted. We doubt very much if even 25 actual cases occur in a year. We have reason to believe that the disease is similarly uncommon throughout the adjoining localities. It would seem therefore that typhoid vaccine would suffice for any person residing most of the time in these areas. If a person travels to Southern States, where we have reason to believe paratyphoid infections are more common, or goes abroad, where paratyphoid infection is a definitely known risk, the combined vaccine is more desirable.

"The reactions which occur after typhoid vaccine, or more especially after the typhoid-paratyphoid vaccine, are largely avoidable. The dosage as generally employed is based on experience and expediency, *id est*, the dosage usually recommended constitutes the minimum desirable. Injecting the total amount in three doses is a compromise between reactions on the part of the vaccinated and the convenience on the part of the vaccinator. There is no evidence which contraindicates giving a greater number of smaller doses. In fact, there is distinct evidence that the standard amount given in this way would give a greater immunity. This is indicated by the results obtained by immunizing laboratory animals. The tendency in recent years has been toward the administration of smaller doses more frequently repeated. This procedure is very much better for the animal and yields antiserums of high titre.

"These observations have been so general in all laboratories that we have no hesitation in recommending the use of smaller (and more frequent) doses of prophylactic vaccines, to eliminate or to minimize reactions, especially where convenience or haste is not a contra-indicating factor. The first dose might be 0.25 c. c. The subsequent doses are increased according to the results obtained. On the whole, it would be well to give the total 2.5 c. c. as generally recommended, though less would undoubtedly suffice."

**ANOTHER OUTBREAK OF FOOD POISONING DUE TO CONTAMINATION OF
CREAM FILLER IN A BAKERY, REPORTED BY THE NEW YORK CITY
HEALTH DEPARTMENT**

The following report, submitted by Walter B. Drennan, chief inspector, Brooklyn office, Division of Foods and Drugs, was printed in the Weekly Bulletin published by the Department of Health, City of New York, March 28, 1925:

"Toward the end of December, 1924, private physicians reported 94 cases of food poisoning due to cake purchased in a local bakery, in Brooklyn.

"The homes of all the ill persons were visited, and the attending physicians were interviewed by inspectors of this department. In every case, the symptoms were the same, i. e., nausea, vomiting, chills, fever, diarrhea and severe abdominal pain.

"Investigation showed that cream-filled cake, purchased at a certain bakery, on the same day, was the food consumed in common by the 94 persons affected.

"Owing to the early reporting of these cases, samples of the cake in question were obtained at the homes of three patients. These specimens were examined at the Bureau of Laboratories and the 'cream-filler' was found to contain *Bacillus enteritidis*. Over 70 per cent of the stools of the 94 cases showed the presence of the same bacillus.

"Chemical and bacteriological examinations of the ingredients, used in the manufacture of the 'cream-filler,' namely, milk powder, butter, eggs, starch, sugar, flavor, and water, were negative. Two subsequent examinations of the 'cream-filler' were negative.

"Bacteriological examinations of the stools of the four employees and of the proprietor showed the presence of *Bacillus enteritidis* in stools of the baker who prepared the 'cream-filler.'

"Widals and reexamination of the stools of the employees and of the proprietor were negative. No history of recent illness was obtained. None of them ate the 'cream-filler,' except the baker who had a positive stool. He stated that he always samples the products which he prepares.

"No mice or rats were caught by traps set for that purpose. No animal excreta could be found for examination. A thorough survey by a bacteriologist and by food inspectors failed to disclose any additional information.

"The remaining ingredients used in the manufacture of 'cream-filler' were destroyed. After all utensils had been sterilized, the bakery was permitted to operate.

"All the patients made a rapid recovery."

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by Boards of Review at naval training stations:

Cumulative data for January 1 to March 31, 1925

ALL NAVAL TRAINING STATIONS

	Number	Per cent of recruits received	Per cent of recruits reviewed
Recruits received during the months.....	2, 818	-----	-----
Recruits appearing before board of review.....	137	4. 86	-----
Recruits recommended for inaptitude discharge.....	115	4. 08	83. 94
Recruits recommended for medical survey.....	0	0	0
Recruits recommended for transfer to hospital.....	0	0	0
Recruits recommended for retention under training.....	22	95. 92	16. 06

U. S. NAVAL TRAINING STATION, HAMPTON ROADS, VA., MARCH, 1925

Recruits received during the month.....	53	-----	-----
Recruits appearing before board of review.....	10	18. 87	-----
Recruits recommended for inaptitude discharge.....	6	11. 32	60. 00
Recruits recommended for medical survey.....	0	0	0
Recruits recommended for transfer to hospital.....	0	0	0
Recruits recommended for retention under training.....	4	88. 68	40. 00

U. S. NAVAL TRAINING STATION, GREAT LAKES, ILL., MARCH, 1925

Recruits received during the month.....	34	-----	-----
Recruits appearing before board of review.....	4	11. 76	-----
Recruits recommended for inaptitude discharge.....	4	11. 76	100. 00
Recruits recommended for medical survey.....	0	0	0
Recruits recommended for transfer to hospital.....	0	0	0
Recruits recommended for retention under training.....	0	88. 24	0

Cumulative data for January 1 to March 31, 1925—Continued

U. S. NAVAL TRAINING STATION, SAN DIEGO, CALIF., MARCH, 1925

	Number	Per cent of recruits received	Per cent of recruits reviewed
Recruits received during the month.....	76	-----	-----
Recruits appearing before board of review.....	4	5. 26	-----
Recruits recommended for inaptitude discharge.....	4	5. 26	100. 00
Recruits recommended for medical survey.....	0	0	0
Recruits recommended for transfer to hospital.....	0	0	0
Recruits recommended for retention under training.....	0	94. 74	0

U. S. NAVAL TRAINING STATION, NEWPORT, R. I., MARCH, 1925

Recruits received during the month.....	65	-----	-----
Recruits appearing before board of review.....	5	7. 69	-----
Recruits recommended for inaptitude discharge.....	5	7. 69	100. 00
Recruits recommended for medical survey.....	0	0	0
Recruits recommended for transfer to hospital.....	0	0	0
Recruits recommended for retention under training.....	0	92. 31	0

HEALTH OF THE NAVY

This report is for the month of May. So few monthly reports for May have been received to date, June 15, from ships of the United States Fleet, that sufficient data are not available to estimate health conditions among the principal forces afloat. However, the reports which have been received from ships and the reports from shore stations in the United States do not indicate any notable prevalence of communicable diseases.

The flurries of influenza which appear to have visited certain parts of the country during May apparently did not affect naval personnel attached to shore stations in the United States.

The following morbidity tables were compiled from Form F cards reporting admissions to the sick list of the Navy for the month of March, 1925:

	March, 1920-1924	March, 1925
Cerebrospinal fever.....	0	0
Diphtheria.....	0. 31	0. 21
German measles.....	3. 38	1. 25
Influenza.....	114. 19	25. 40
Malaria.....	13. 50	8. 26
Measles.....	17. 55	3. 03
Mumps.....	24. 63	13. 48
Pneumonia.....	7. 95	2. 72
Scarlet fever.....	4. 29	1. 46
Smallpox.....	. 56	0
Tuberculosis.....	3. 71	1. 15
Typhoid fever.....	0	0

TABLE No. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the month of March, 1925*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength	75,080	39,725	19,827	114,805
All causes:				
Number of admissions.....	2,985	2,664	1,221	5,649
Annual rate per 1,000.....	477.09	804.73	738.99	590.46
Disease only:				
Number of admissions.....	2,655	2,372	1,098	5,027
Annual rate per 1,000.....	424.35	716.53	664.55	525.45
Communicable diseases, exclusive of venereal diseases:				
Number of admissions.....	795	991	436	1,786
Annual rate per 1,000.....	127.05	299.36	263.88	186.58
Venereal diseases:				
Number of admissions.....	949	371	226	1,320
Annual rate per 1,000.....	151.68	112.07	136.78	137.97
Injuries:				
Number of admissions.....	330	284	121	614
Annual rate per 1,000.....	52.74	85.79	73.23	64.17
Poisoning:				
Number of admissions.....	0	8	2	8
Annual rate per 1,000.....	0.00	2.41	1.21	.84

TABLE No. 2.—*Deaths reported, entire Navy, for the month of May, 1925*

	Navy (strength, 94,978)	Marine Corps (strength, 19,827)	Total (strength, 114,805)
Catarrhal fever.....	1	0	1
Pneumonia, lobar.....	1	0	1
Syphilis ¹	2	0	2
Tuberculosis, chronic pulmonary.....	3	0	3
Tuberculosis, other forms.....	2	0	2
Other diseases.....	7	3	10
Drowning.....	3	2	5
Accidents and injuries.....	7	3	10
Total	26	8	34
Annual death rate per 1,000, all causes.....	4.16	4.84	3.55
Annual death rate per 1,000, disease only.....	2.40	1.82	1.88

¹One secondary poisoning, arsenic, acute arsphenamine.

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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officers, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

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SPECIAL ARTICLES

TREATMENT OF ACUTE LOBAR PNEUMONIA¹

By J. E. MILLER, Lieutenant, Medical Corps, United States Navy

Acute lobar pneumonia is an acute and self-limited infectious disease, due to infection with one of the four types of pneumococci which have invaded the lung tissue and resulted in a massive inflammatory reaction in one or more lobes of the lungs and in which the toxins are absorbed into the general circulation and are responsible for the clinical symptoms encountered during the course of the infection.

The course, clinical symptoms, and outcome of the infection will depend upon the virulence of the invading pneumococci and the degree of resistance the patient has to offer against the invading organisms. The infection may last from one to many days and in favorable cases is terminated by crisis in 60 per cent of cases, while 40 per cent of favorable cases end more slowly by the process of lysis. Unfavorable cases terminate in death by progressive and overwhelming toxemia.

It may be stated that man is relatively immune or insusceptible to pneumococcic infection, and this statement is proved by the clinical fact that infection is rarely transmitted from the sick to the ones in attendance, where opportunities for transmission are great. Patients recovering from types 1 and 2 infections rarely suffer from reinfections, and immunity appears to be prolonged. Cole, in a large series of cases, noted but one recurrence in types 1 and 2 infections, while in types 3 and 4 infections immunity is of short duration and reinfection follows in about 20 per cent of cases.

Pneumococci at the present date are classified as saprophytic and parasitic. The former are nonpathogenic, while the latter are pathogenic and are the causative factor in acute lobar pneumonia in people predisposed to the infection. Predisposition to the infection must be present and will be spoken of later under the many factors that lower body resistance.

¹ From the United States naval hospital, San Diego.

Acute lobar pneumonia is of frequent occurrence and is world-wide in distribution. It is found in the land of ice and snow and is met with beneath the burning rays of the tropical sun. It encircles the earth, and its signs, pathology, symptoms, course, and duration are as typical in one location as in another.

It occurs throughout the year, being sporadic during the late spring, summer, and early fall. During late fall the number of cases of infection increases until January, when the acme is reached, and then it slowly declines in frequency until late spring appears. During the cold part of winter in the north and during the rainy season in the tropics one meets most cases, and, consequently, season appears to offer a special predisposing influence.

From lack of proper registration, universal in character, the prevalence, the morbidity, and the mortality of the infection probably will never be known. It may be stated, however, that acute lobar pneumonia is of great economical importance in that it most frequently attacks persons between the ages of 16 and 62, or the period of man's greatest financial productivity.

Among the special predisposing causes which lower the body's resistance and predispose to the infection are prolonged hunger or lack of food supply; overwork, leading to a state of profound fatigue; lack of sleep and rest; undue exposure of the body to changeable weather; surgical shock and ether anesthesia; chronic alcoholism and chronic wasting diseases; and, probably the most important factor, acute catarrhal fever or infections of the upper respiratory tract. Cole noted that coryza preceded the development of lobar pneumonia in about 40 per cent of his cases, and histories taken at this hospital reveal that about the same number of patients suffer primarily from acute coryza. Coryza should be taken as a warning signal that the body resistance is below par, and it should be treated with a few days rest in bed and careful dietetic and eliminative treatment.

The pathology of pneumonia as demonstrated by Osler in the autopsy room has never been improved upon by descriptive literature, but ante mortem pathology, as ascertained by X-ray study of the pneumonic lung during the course of the infection, is of interest in regard to accurate diagnosis. It is a process that should be a routine procedure in all hospitals, and all class A hospitals should have a portable X-ray machine in order to carry out this study. Radiography confirms the diagnosis of every case examined by the usual methods of physical examination. It is less fatiguing and inconvenient to critically ill patients than the physical methods of examination and its results are much more accurate. Films may be placed beneath the patient's back while in the prone position and the exact degree of pathology determined in a few minutes. In

deep-seated or central pneumonia the X-ray will determine the diagnosis before the physical signs of the infection are apparent and will render the physician more accurate in differential diagnosis. It demonstrates an early pleuritis and effusion and forecasts the possibility of a beginning empyema. Later it reveals the presence of a toxic heart, or diagnosticates pericarditis with effusion, and assists in the localization and aspiration of walled-off empyema. Still later it reveals the presence of unresolved pneumonia for weeks or months in patients in apparent good health. Later yet, organization, with the development of pleural or pericardial adhesions, can be seen in patients partially recovered from pneumonia and who complain of chronic cough, shortness of breath, sense of oppression in the chest and, often, precordial pain. These patients are best termed pulmonary cripples and are constant sufferers from their previous lobar pneumonia.

The symptomatology and treatment of lobar pneumonia are best described in association, as the treatment of the disease is based purely upon the physiological principles of health and the attempt is to place the body in a state that approaches, as nearly as possible, the physiology as found in the normal and healthy body. Type 1 serum is only an added feature after the proper body requirements are obtained. It acts, possibly, as a reinforcing agent in the development of immunity by a passive process.

Under prevention, the predisposing causes of the infection are to be avoided. Prompt isolation and treatment of all cases of acute catarrhal fever, not only as a preventive of pneumonia but also of other respiratory infections, proper food-supply and clothing, and the proper amounts of sleep and rest are all important.

As the symptoms of pneumonia are due to toxemia, they are to be treated upon the same principles as any other toxic process. To begin with, the chill, which is present in 50 per cent of cases, is due to the rapid absorption of pneumotoxin, which is a foreign protein, into the circulation, and is the first step in protein shock. If the toxin is absorbed more slowly, chilliness is manifested. This symptom is about as common as a severe chill. During the chill or chilly stage the patient usually goes to bed voluntarily. If not, he is to be placed in bed, to remain there until he has passed through a satisfactory convalescence. Transfer to hospital should be undertaken early, and no patient should be moved from his sick bed if the disease has been present more than 24 hours. Movement after this time will lessen the patient's chance for recovery and will often be responsible for his death.

Within a few minutes after, or simultaneously with, the chill or chilliness, which is the result of foreign protein within the circula-

tion, elevation of temperature and leucocytosis appear. The fever and increase of white blood cells are the reaction of the body against the foreign protein and the first steps in the process of active immunity formation.

The temperature and the leucocytosis vary in accordance with the rest of the symptoms and depend upon the degree of toxemia present. The fever should be viewed as a beneficial reaction, and the use of antipyretics to combat it should be considered as malpractice.

A competent nurse is a necessity. The patient, once in bed, will usually find the prone position more comfortable than the lateral position upon the affected side, as usually described in older textbooks. Any movement of the patient, as changing position, is accomplished by the nurse or the doctor during the process of examination. Physical examinations are fatiguing and often painful if not performed skillfully and are best limited to one examination per day. Bedpans and urinals are adjusted to the patient's needs, and under no circumstances is he allowed to sit up in bed for the use of these receptacles. Reclining upon bed rests is to be avoided because of the work and muscle tension required and because muscular relaxation and rest are prevented. Strength must be maintained at all costs.

For fever, water should be given freely and without hesitation. In many cases it must be forced and at times given by proctoclysis, hypodermoclysis, or intravenously. The water intake must be sufficient to dilute the toxins held in the circulation and to aid in their elimination through the skin, kidneys, rectum, and lungs.

Food is of secondary importance and should not be forced but should be given to the patient as he desires it, preferably in the form of peptonized milk, buttermilk, broths, eggnogs, fruit juices, and ice creams during the fever period. After the fever has subsided, regular articles of diet are slowly resumed.

The bowels should be moved daily by enemas, which are less weakening to the patient and more scientifically employed than drugs, as constipation in fever is due to the absorption of fluid from the rectum, and the fecal accumulations are best washed away.

Cold baths or packs are contraindicated because of the superficial vascular constriction and internal congestion they produce, and both phenomena prevent heat loss and elimination that should occur through the skin by the process of evaporation. Warm and gentle baths are of hygienic importance but, from a physiological point, are of little benefit to the patient because of their momentary contact with the body. Fever, after all, is perhaps a very important agent in the neutralization and elimination of toxins, in that it

produces superficial vascular dilatation and assists the body in fighting infection, provided that the fluid intake is equal to the fluid loss by the body.

During treatment sleep and rest must be secured.

Visitors should be limited to the immediate members of the family, and these allowed to remain for only a few minutes during the wakeful hours. Restlessness and insomnia are to be prevented. The common cardiac stimulants, such as caffeine, strychnine, alcohol, and camphor, are to be avoided. It is a question if these drugs are cardiac stimulants, but there is no question that they are stimulants to the nervous system and will cause restlessness and sleeplessness and will aggravate these states if already present.

During sleep, rest of the body occurs and, according to Claparede, sleep is as essential for rest as food is for hunger. During sleep and rest, voluntary and involuntary muscular relaxation occurs and rest to the heart is secured in a greater degree than by any other method, including digitalis therapy. Sleep has definite antipyretic effect in fever patients and Benedict and Carpenter, in basal metabolism tests performed during sleep, found that heat production was reduced 15 per cent over the wakeful hours.

Early pain in the affected chest is frequent and is usually due to an associated pleuritis. It soon disappears if uncomplicated. If complicated with empyema, it is persistent, progressive, and associated with intercostal tenderness which is very marked. The latter finding is due to pressure exerted upon the inflamed pleura by palpation of the intercostal spaces. It is a valuable sign of empyema and pleuritis and is but little mentioned in writing. Pain of pleural origin may be referred to the epigastrium or to McBurney's point, but careful physical and X-ray examinations of the chest will differentiate the acute abdomen.

Simple pleuritis can be relieved by strapping the chest with adhesive plaster applied over the involved lobe or area. No ill effects have been noted from strapping. The entire chest need not be strapped for fear of interference with the respiratory excursion of the normal lung. Suppurative pleuritis, regardless of the number of pus cells present in the fluid, provided it remains sterile after 72 hours' culture, can usually be treated successfully by repeated aspiration over a prolonged period, but when the pneumococci are found in the smears or cultures these cases require prompt surgical intervention. Drainage must be sufficient and over a period long enough to allow restoration of the infected cavity. Improper and insufficient drainage is responsible for many chronic and incurable empyemas.

The use of morphine should be especially stressed. It is the most valuable drug that we have to depend upon in the treatment of lobar pneumonia. All patients will not require its use, and it should never be withheld if definitely indicated. It is indicated in severe pain, uncontrollable paroxysms of coughing, profound restlessness and sleeplessness, and where the pulse is very weak and thready, and, if employed under these circumstances, will offer the patient all the benefits that are derived from sleep and rest. Morphine is best used alone and not in combination with atropin, for if the former drug must be repeated often, even the small doses employed may cause an overphysiological action of atropin, which will result in delirium and blocking of the physiological excretions and will prevent proper body elimination.

Rapid heart action, vomiting, and tympanites are of central origin and due to profound toxemia acting upon the vagus nerve. The toxemia in favorable cases produces a temporary inhibition of the nerve, which results in tachycardia and paresis of the intestines, with dilatation and gaseous distention. Pituitary extract in 1 c. c. doses is highly lauded, but no marked effect has been witnessed by the writer during its employment. The signs and symptoms usually lessen as recovery approaches or deepen as death approaches and are little modified by treatment. During gaseous distention, rectal tubes may be employed and water given per rectum. Food and water are best withheld by mouth and abdominal stupes are indicated.

Certain signs and symptoms occurring during the infection have been looked upon as indications for cardiac stimulation. Among these may be mentioned cyanosis, rapidity of pulse, and low blood pressure. The rapidity of pulse is due to toxemia and vagal depression; cyanosis is, according to Lundsgarrd, due to the changing of oxyhemoglobin into methemoglobin, and low blood-pressure reading is an incidental occurrence, for as many patients with low blood pressure recover as do with normal pressure readings. Under such circumstances, any drug used must possess detoxifying power if these symptoms are to be modified, and, at present, the best agent in Type I infection is antipneumococcic serum, although digitalis is used empirically by many.

The value of digitalis in the treatment of pneumonia remains an unsettled question. The experiment of Newburge, Means, and Porter will best describe why digitalis therapy fails in many of the digitalized pneumonia patients, for they found that death in pneumonia is usually the result of respiratory failure instead of cardiac failure, due to severe toxemia acting upon the respiratory centers. Experiments upon pneumonic dogs revealed that no changes occurred in the hearts of dogs dying of pneumonia, and the experimenters noted that respiration failed before the heart action ceased.

If, after the dog's death, artificial respiration be performed, the heart will contract for two or more hours after spontaneous respiration has ceased. Further experiments revealed that the hearts of pneumonic dogs would contract as well as the hearts of normal dogs, provided the pneumonic hearts were fed upon normal blood.

Further it was noted that if normal hearts are fed upon pneumonic blood marked impairment of contraction results, and toxemia is the cause of death instead of heart failure.

Digitalis is used by many in the treatment of pneumonia and is *not* employed by almost as many physicians. James Mackenzie, the able cardiologist, states in his latest book that he has noted no value derived from the use of the drug in pneumonia, and this view is rapidly gaining foothold throughout various countries. However, there seem to be two direct indications for digitalis during pneumonia. These are the presence of auricular flutter and fibrillation, when the drug should be used in physiological dosage. Routine digitalization should never be employed unless controlled by electrocardiographic study because of the heart block it often produces.

Cardiac irregularities have not been noted among the cases treated at this hospital, probably because of the youth of the patients and their freedom from organic heart disease prior to enlistment. In older patients, where heart trouble precedes an attack of pneumonia, Chatard noted irregularities in 15 per cent of 658 patients, and Cole noted irregularities in 10 per cent of 489 pneumonic patients. Thirty-three per cent of Cole's cases revealed heart block and many of these cases resulted from the routine use of digitalis. If heart block appears during treatment, with or without the use of digitalis, the drug should not be given or it should be discontinued if being employed.

During the past four years, 62 pneumonic patients with diagnosis confirmed by X-ray examination have been treated upon the above principles with three deaths, or a mortality figure of 6.3 per cent. These mortality figures are very favorable when compared with the average figures, which are stated to be between 25 and 30 per cent.

The above cases were all treated without the use of serum. Fifty-nine marines and sailors were treated and all recovered. Three deaths occurred in supernumerary patients who were chronic invalids since the World War, and their pneumonias were terminal infections.

Five of the 62 cases developed empyema—in one case empyema complicated pneumonia in a supernumerary who died, while four cases, occurring in sailors, resulted in recovery following pleural drainage. Two cases were complicated by lung abscess, and both recovered under the expectant form of treatment, bronchial drainage being sufficient in both cases.

SECONDARY NEUROSYPHILIS IN THE NAVY¹

By ERASMO EHRENFREUND, Royal Italian Navy

Translated by R. F. SHEEHAN, Lieutenant Commander, Medical Corps, United States Navy (retired)

As far back as 1898 Professor Rubino (*Hospital Gazette*, No. 43) observed that epilepsy can be a manifestation of syphilis, not only in the tertiary period, where it is due to grave alterations in the structure of the skull and brain, but also in the secondary phase, where it can be due only to lesions of a superficial and curable character or to the direct action of the virus on the epileptogenic centers, particularly, but not exclusively, in individuals predisposed to neuropathies. He infers, therefore, that "it is permissible to consider as secondary syphilitic, epilepsy cases in which the epileptic syndrome developed during adolescence without recognizable cause in individuals who were not previously subject to any nervous disorder whatsoever, and in whom syphilis was either always latent or, at any rate, revealed its presence only by manifestations of little importance." However, he maintained that the clinical picture of secondary syphilitic epilepsy does not differ from genuine epilepsy or from other symptomatic epileptic manifestations by any well defined characteristics. It was due mainly to this very reason that he was forced to the conclusion that no one could speak of "a morbid form (of epilepsy) clinically autonomous, but only of a morbid form whose autonomy is derived only from specific etiological conclusions which this disease furnished us with respect to its prognosis and therapy." In spite of the fact that he cites only two cases to substantiate his views, these were sufficient to enable him to delimit clearly the boundaries of a problem already amply treated in medical literature, but never definitely stated and proved.

From the time of Paracelsus it had been known that syphilis could cause cerebral disturbances. Ambrose Paré, the renowned anatomist, physiologist, and military surgeon, asserted that certain syphilitics were subject to epileptic attacks. Morgagni found that a syphilitic woman who had died in a state of coma after having suffered epileptiform attacks showed two gummata of the frontal bone which had penetrated the meninges and brain. Still, in more recent times, not a few authors, such as Hunter and Lesague, have assumed a very skeptical attitude toward the nature of nervous maladies attributed and attributable to syphilis.

Strümpell says that "attacks totally analogous to those present in genuine epilepsy not infrequently occur from diverse anatomical lesions of the brain, as tumors, syphilis, etc., but these should be regarded only as symptoms of other affections, and hence they ought

¹ From *Annali di med. navale e coloniale* 2: 1 and 2, 1923.

to be called *epileptiform attacks* in contradistinction to genuine epileptic attacks."

In tertiary syphilis we may find endoarteritis, meningitis, encephalitis, and gummatous tumors along with a whole train or series of manifestations of which the convulsive phenomena are generally the least important. Convulsions occur especially in gummatous meningitis of the cerebral convexity and in cases of internal exostosis of the cranium. But the remarkable thing is their sudden appearance and also that, according to the most competent authorities, the supervenient loss of consciousness does not appear at the beginning of the attack. The so-called Jacksonian epilepsy, or partial epilepsy, a very infrequent morbid entity which has substantially very little in common with epilepsy, almost always, if not always, indicates nothing else but a tertiary stage of syphilis.

The first to state that even in secondary syphilis there may be present convulsive epileptiform attacks was Fournier. In a study of secondary syphilitic epilepsy he came to the conclusion that it is not possible to assimilate epilepsy, which is a disease essentially chronic in character and which pursues an inexorable course, with a temporary affection readily yielding itself to treatment by mercury. Therefore he was inclined to consider syphilitic epilepsy, which always follows a benign course, as an *epileptoid neurosis*—i. e., as a specific neurosis "masquerading under an assumed aggressiveness." But at the same time he confessed that his clinical experience in these matters was too limited to serve him as a basis for discussing a subject so debatable. In his classical Treatise on Syphilis (1906) he sketched the picture of secondary syphilitic epilepsy by fully describing three cases; and while he confined himself to the lengthy delineation of gummatous tumors, gummatous infiltrations, and particularly of syphilitic cerebral arteritis, he nowhere makes explicit mention of tertiary syphilitic epilepsy.

In ordinary practice tertiary syphilitic epilepsy is a form commonly admitted but rarely met with, while the secondary phase is almost entirely unknown.

Cognetti de Martiis, a very careful observer, in his Century of Epileptics (Ann. Naval Med., 1:521, 1903), found only three syphilitics (Nos. 21, 40, and 43) in whom the elements of heredity, functional disturbances, and psychopathological phenomena were scarcely noticeable, and degenerative characteristics almost nil. In concluding his study he did not give any etiological value to syphilis as a causative agent of epilepsy. Moreover, in his accurate general review of epileptics (Ann. Naval Med. 2:24, 1902) he merely intimated that Loewenfeld had placed cerebral syphilis among the causes of Jacksonian epilepsy as well as of its equivalent psychic manifestations. In the selfsame review he made a report of two

cases taken from the writings of others of epilepsy which were also syphilitic, but without narrating this additional circumstance. It is a noteworthy fact that in one of these syphilitic epileptics the attacks almost always came upon him without superinducing loss of consciousness.

Fournier claimed to have observed only about a dozen cases of secondary syphilitic epilepsy during his whole practice. In these he noted an absence of the initial cry during the advent of the attack, strange convulsive crises, with a dazed, terrifying cast of features, gnashing of the teeth, clonic spasms, and concomitant symptoms of hysteria, as he was accustomed to observe in numerous cases of secondary syphilitic neurosis of an exclusively hysterical type. He noticed, among other things, analgesias of the breasts and back of the wrists as characteristic signs in many cases of secondary syphilitic neurosis. In fine, he declared himself of the opinion that secondary syphilitic neurosis was of more frequent occurrence among women than among men.

According to Roncaroni, in secondary syphilitic epilepsy the eye shows an intense congestion of the retina. But Vizioli and D'Abundo have noted the same fact in other forms of epilepsy, but without noticing any signs of cerebral anemia. Roncaroni himself, in his *Clinical Treatise of Epilepsy*, states that 3 of the 50 epileptics whom he observed had had syphilis, and he remarks that the sum total of epileptoid phenomena attributable to syphilis would increase enormously if epileptiform attacks which occur in progressive general paralysis were taken into consideration.

The serum reaction of Wassermann and the cutaneous reactions of Noguchi have permitted the widening and precise demarcation of this field of observation. Thus it is possible to-day to append and explain a rather large series of cases of convulsionary syphilis compiled during a period of almost six months.

Case I. Seaman C. A.—Contracted syphilis just after enlistment. After a lapse of two years he was found on the streets in a state of psychic excitement and sent to the hospital at Spezia for a few days, where he became calm. Two months later under stress of violent agitation he entered a pharmacy and broke all the show windows. Again sent to the hospital, where no other symptoms of a hysterical or epileptic nature were observed. A very remarkable fact was that he maintained an obstinate and absolute silence for one week. Some time later he suddenly started to run, broke a window by repeated kicks, and then fell into convulsions. He manifested no functional disturbances of the reflexes or sensation. He was held for observation on the charge of simulating. Six months later he once more broke into a pharmacy and broke all the

show windows, for which he was again remanded to a hospital with "psychomotor excitement"—i. e., convulsions accompanied by outbursts, but without frothing at the mouth or loss of consciousness. He had normal reflexes, remained doubled up in bed, at the same time emitting groans without intermission. He refused to answer anyone. He hid bread, cigarettes, and calomel. Wassermann test was uncertain. Gentilizio's was negative. He was of good moral conduct.

Case II. Seaman A. C.—Nothing definite could be ascertained with regard to syphilitic infection. He was found stretched at full length on the ground in one of the public parks of Venice in the throes of violent agitation. He was hurried to a hospital, suspected of being the victim of an epileptic attack. He presented numerous excoriations of the cheeks and remained the whole night in a state of apparent unconsciousness. But four days later, eluding the guards, he threw himself into a well, from which he allowed himself to be rescued without trouble. From that moment on he was very calm. Constitutionally sound and robust, revealing no appreciable physical defects save a certain nearsightedness, which was not very acute. He complained continually of slight headaches. His aspect was one of great preoccupation, sullenness, and lugubriousness. During the first weeks of service aboard the battleship *Eritrea* he had been classed as a dependable, serious character, and as a person of good behavior, but in two months, during which time he presumably contracted syphilis, he became frivolous, at the same time showing a great repugnance to all work, in consequence of which he soon acquired the reputation of a degenerate, insubordinate person of very reprehensible conduct, but withal intelligent. He possessed a poor, deceptive memory. His religious tendencies and sentiments were highly developed. His vegetative faculties functioned normally. Prior to his enlistment he had never suffered from any nervous maladies, epileptic or psychic disturbances. He came of a very respectable and quiet family, although he had a brother in an insane asylum, a sister had died of tuberculosis, and his mother had heart disease. He was finally declared unfit for naval service but not epileptic.

Case 3. Sailor V. S.—Had been a syphilitic for an indeterminate period. He claimed that due to this infection a daughter, whom he very greatly desired, had not been born. Three months after he had enlisted he ran through the thoroughfares of Spezia, naked, as a man out of his mind. For this reason he was sent to a hospital, where he became very quiet, but was detained for simulating. Later on he suffered violent convulsive attacks during which

he broke a pane of glass. He showed an abnormally high pulse, sluggishness of the cremasteric and abdominal reflexes, cutaneous hypesthesia, and slight functional disorders attributed to tobacco. After a long period of observation he was dismissed as "not insane." He was, however, still classed as a person of mediocre abilities, characteristically lazy, with little ambition, but of good conduct. Thus two years passed, when one evening while en route to a coast battery he was heard to cry out in his sleep: "Give me my daughter!" Later he arose and appeared very thoughtful, his face presented a disturbed aspect, he refused breakfast, seized a rifle and fired a shot into the air. Then he threw himself upon his face and became violently agitated and convulsive. A lieutenant who was present during these occurrences noticed that the patient's acts were performed with none of that "inconsiderateness which characterizes the actions of those mentally deranged," for he had fired the rifle in such a manner as to injure no one. In the hospital where he was sent for observation he maintained a calm exterior, but slept very little and claimed to be suffering with a constant headache. In appearance he was sound and robust, of a vivacious aspect, intelligent, and cunning. He showed a slight facial asymmetry, adherent ear lobes, diffuse pityriasis, of which he was anxious to be cured, and incipient loss of hair. He was passionately addicted to sexual pleasures, was abundantly tattooed with erotic symbols, but did not manifest the characteristic actions of a syphilitic patient. He had submitted to various mercurial treatments, one of which had evidently made possible the period of recovery and calm experienced while he was in the hospital. He was the offspring of unknown parents and considered an epileptoid.

In addition to these three typical cases just cited, Dr. Erasmo Ehrenfreund gives 22 other cases which exemplify like conditions. Since the cases quoted fully illustrate the characteristic manifestations prevalent in this disorder, it has been deemed unnecessary in translation to subjoin the remaining cases.

It will be noticed that this compilation of cases includes neither officers nor noncommissioned officers. This fact is easily explained if we but bear in mind that the noncommissioned officers are, as a class, well advanced in years; hence when syphilitic they have already passed through the secondary stage of the disease. With officers it may be remarked that they adhere to medical advice and carry out the prescribed treatment with scrupulous care and with greater diligence than the ordinary seamen, to say nothing of the well-known fact that they exercise greater self-control—a factor of undeniable value when dealing with psychoneurotic disorders as those encountered in the aforementioned cases, since their one common and characteristic feature is the patients' incomplete loss of consciousness.

From a practical point of view this casuistry of neurotic disturbances exhibits a multifarious and grand variety of symptoms without impairing the evident unity of the clinical picture. Thus in one case we have an example of Jacksonian epilepsy, in which we see what an insignificant place may be occupied by localized and partial attacks which ought to be distinguished in the complete survey of this disorder. It reveals equivalent epileptics of many kinds and offers a curious multiplicity of semeiotic diagnostic terms which are employed merely to express one and the same thing. On the other hand, as Tanzi pointedly remarks, epilepsy never existed as a particular diagnosis, and consequently it should be readmitted into the clinic "piecemeal under the anonymous captions of syndromes and symptoms in treating cerebropathological cases because these affections are of such a nature that one is justified in associating them with epilepsy, or rather in claiming that cerebropathies produce epilepsy." As a diagnostic term epilepsy may be tolerated though restricted in its application to those forms of epilepsy which betray their origin by a certain functional asymmetry of the brain, accompanied by a marked facial irregularity, at the same time presenting classical signs of the well-known innocuous "falling sickness." Furthermore, since epilepsy is a neurosis, all the neuropathic exhibitions of syphilis, when taken independently of the varied convulsive aspects under which they may reveal themselves, are qualifiable as *syphiloneuroses* in identically the same manner as all cutaneous eruptions observable in the same disease can be denominated as *syphiloderms*.

Secondary syphiloneurosis manifests itself in the forms of attack exemplified in the foregoing cases. It is this characteristic which serves to differentiate it from the tertiary form, in which the manifestations are continuous in nature and slow in progress. Such, in fact, was the type of neurasthenia observed in four officers suffering from tertiary syphilis during the period in which the above cases were gathered.

The Wassermann reaction was positive in them, as it always is, either in the blood or in the cerebrospinal fluid, in progressive paralysis, and in tabes. Thus in one case of syphilitic mental alienation accompanied by maniacal excitement, delirium, hallucinations, etc., the Wassermann, according to Farrère, was hyperpositive.

In this case some of the symptoms of the patient could have been considered as equivalently epileptic, but the continuous psychopathic state clearly demonstrated that it was actually tertiary syphilitic arteritis. Once the patient had been placed in a hospital and subjected to specific treatment her recovery followed—a fact which many never expected. In this, as in other affections, Ricord's saying holds true: "With smallpox all is possible, even the impossible."

The results of the Wassermann test, as has been noted, are misleading in such secondary syphilitic forms as result purely from tonic phenomena, whether these are nervous or cutaneous in nature, and whose pathognomonic genesis is analogous to other dermatoses of an infectious or even of a botulistic origin. For these forms Noguchi's reaction seems to give better results. On the other hand, in tertiary syphilitic forms which show phlogistic lesions of the tissues, whether neoplastic or hyperplastic, Wassermann's reaction is at present so enlightening that the antiquated, uncertain theories of Fournier on quaternary syphilis, as well as the so-called parasymphilitic affections, can be definitely abandoned. This step has become necessary for the simple reason that it is difficult to see how the above-named disorders could occur through the influence of degenerative phenomena, promoted, as these were supposed to be, by syphilitic infections whose virulence was already spent. It is hard to explain how an effect can continue when the cause has long ceased to exist. It is interesting to know how the treponemata embedded in the most hidden recesses of the organism are able to carry on their work of destruction and yet remove themselves from the peripheral regions of the organism when the ordinary curative media are applied.

The attacks of syphiloneurosis may be very violent, but they are never dangerous. From this coign of vantage syphilis, that much maligned affection, has shown a marvelous tractability. In the clinical reports one seeks in vain for a single drop of blood shed through sanguinary outbursts. Whatever blood was shed was due to the harmless breaking of glass. Attacks accompanied by sanguinary impulses are a characteristic of alcoholic epileptics who were conceived in a period of drunkenness. In a word, such manifestations arise from alcoholism regardless of whether the factors are due to intoxication or are products of degenerative tissues.

The violence of syphiloneurotics vents itself in the breaking of glass. Epileptics, on the contrary, as Tanzi well remarks, under the stimulus of an external emotion often set themselves against pantoclastic impulses in such a manner as to convey the impression of actual intention and deliberation. Every case shows that in syphilis the pantoclastic obsession manifests itself in an especial manner, known technically as "intentional hyaloclasty," although what there is of the intentional is obscured by the partial unconsciousness of the patient. Hyaloclasty, or the mania for breaking glass, is manifested by every patient, the consequence of a peculiar sensory attraction which all translucent surfaces exert upon them. Hence such unfortunates, instead of throwing themselves against a closed window or a pane of glass may cast themselves into the water. It

would be a mistake to qualify this as an attempt at suicide, for, in like cases, it is simply an act equivalent to hyaloclasty.

One day while the writer was in Spezia he chanced to look through a window, when he saw an artilleryman suddenly hurl himself, with head lowered, against the show window of a music store and then fall into convulsions in a state of partial unconsciousness, yelling at intervals, "Return my horse, return my horse!" He at once recognized a case of syphilis. His observation was correct, for Wassermann's test revealed a case of secondary syphilis. This distinct diagnosis is possible because the so-called syphilitic epilepsy differs from the true epilepsy by well-determined characteristics, a fact which renders it possible to recognize this disorder at a distance.

The impulse to precipitate oneself against transparent surfaces is connected with a greatly confused state of mind which finds external reflexion in an expression of terrible anguish, which Fournier improperly called one of stupor. This is also different from the expression of anger of the alcoholic epileptic and from the bewildered, vacant look of epileptics properly so called. These are differences which are appreciated only by the eye of a trained observer. The suffering of the syphiloneurotic manifests itself in insomnia, which persists long after the attack, and in the protracted restlessness, which in some cases causes him to pace up and down a room for days at a time.

In determining syphiloneurosis, syphilis alone is sufficient, for there is no need of neuropathic predispositions. In fact, only five cases revealed any signs of degeneracy, and these were of an inconsequential character. The auricular lesions met with in four cases may have an epileptogenic value, but even these signs, when encountered in syphilitic patients, are caused by syphilis. Tattooing can not be invested with any certain degenerative value, especially when found on seamen. In most cases the subjects of these markings were of an amorous, professional, or patriotic character. In no case did they represent that obscenity, those signs of vengeance, those subversive symbols which are seen in the delinquent alcoholic epileptic. In fine, in only five cases were the parents neuropsychopathic. Two were the sons of unknown parentage. On the other hand, it is a well-known fact that one may meet with cases of mixed neurosis. Thus in one case the progressive trauma could be considered as a concomitant cause of neurosis. In another case the obstinate nocturnal enuresis may be, according to Tanzi, equivalently epileptic and consequently independent of syphilis, because it existed before it. The fact remains, however, that the epileptoid phenomena exhibited themselves only after the subject had contracted syphilis.

There may also be cases of transition from secondary to tertiary syphiloneurosis, in which, along with occasional manifestations, those of a continuous character begin to make their presence known. These gain the full mastery of the situation only when the third stage has completely set in. Then the occasional manifestations cease or occur intermittently and with lessening frequency.

Secondary syphilitic neurosis is met with while syphilitic cutaneous manifestations still exist. But, generally speaking, it appears when these lesions have already disappeared for some time, though it can appear even when the infection has given place to cutaneous manifestations of a secondary character. Naturally it may coexist with inguinal and epitrochlear adenopathy. Neurosyphilis not being well known, it is natural that mistakes should be made in diagnosis. But this does not prove that in cases where secondary manifestations of the skin or mucosa are barely noticeable, or at best insignificant, syphilis will take greater hold on the nervous system, as Broadbent seems to think; and still less does it prove that there are two different kinds of syphilis, as there are two kinds of malaria, determined by two pathogenic agents of diverse structure, one of which is adenophilic and the other neurophilic, because such a possibility can not be accepted without adequate laboratory proof.

What is the answer which one should give to the query, "Should secondary neurosyphilis, inasmuch as it is epileptiform, be a legitimate cause for the discharge of seamen from active service?"

The list of physical defects exempting from the naval and military services includes epilepsy as a cause for discharge. This was established in 1886 and further amplified in 1917 to include epilepsy in its various forms and gradations. Hence secondary syphilitic epilepsy being specifically mentioned in medical treatises, discharges were legally necessary. This shows that man is a slave to words, because the same case may be regarded as a reason for discharge or not, depending upon whether it be considered a case of epilepsy or syphilis.

It is not our present purpose nor is this the proper place to discuss the advisability or the necessity of discharging all epileptics without distinction as to whether they were insane epileptics who were sent to an asylum and later discharged as cured or epileptics who have lived tranquilly in the society of their fellow men. This latter class can well render military service in a contingent of the second class in case of general mobilization. Neurotics are only discharged from the Navy when they present grave, persistent, or recurring manifestations, and the same rule could be applied to epileptics who suffer from a specific neurosis. Historians affirm that Napoleon was

an epileptic. In the recent war many acts of great heroism were performed by persons who were subject to the "falling sickness," as the records testify. In any case sailors ought never to be discharged on the plea that they are afflicted with secondary neurosyphilis or even secondary syphilitic epilepsy, because they are able to render useful service, provided of course, they have been intensely treated. Moreover, in treating syphilis among seamen the basic fact that we are confronted with a malady which is not entirely unconnected with the service as such should never be lost sight of.

Surely when a sailor contracts syphilis after his enlistment he is not precisely in such conditions as provided for and foreseen in article 42 of September, 1895, on pensions, but, nevertheless, he does find himself in conditions that are somewhat analogous. It is a commonplace to remark that when a young man joins the Navy and is taken far from the place of his actual domicile where he could have found inducements to marry or, at any rate, where he could have found means of safely allaying his sexual desires, such hankerings, due to the fact that he wanders hither and thither over the high seas, must be satisfied in brothels in ports where the syphilitic virus has become internationalized. This is the prime reason why with seamen the probability and risk of infection is greater. But many pensions have been granted for infirmities the cause of which it would be less easy to prove were the direct result of service or were caused by the service.

With this in mind, consider that of the 25 syphilitic seamen whose clinical histories we have given, only 4 contracted the disease prior to their enlistment, while 12 certainly contracted the infection after enlistment, and in 9 others the infection occurred at a time which could not be definitely settled, but which was more probably after than before their enlistment.

To demand or even to desire the practice of chastity, with all its possible consequences, by seamen would be absurd. The strenuous, dangerous, and elemental life of the Navy is not productive of nor conducive to asceticism. Anyone who has seen acts of the greatest heroism performed during storms which try the souls and mettle of the staunchest commanders by men who were syphilitic, and not only syphilitic, but who had been saturated with mercury and had suffered attacks of nervous excitement the day before, can testify to this fact.

Historians do not say that Nelson resented the fact that Emma Liona was syphilitic, but we know that she died of syphilis. The harbors of Spezia, of Nagasaki, etc., literally swarm with sailors. This is one and the shady side of the grand problem of the dominion of the seas, but it represents only a small factor, smaller because of the encouraging possibility of combatting it successfully.

SPRUE—WITH REPORT OF A CASE¹

By W. A. HORNADAY, Lieutenant (Junior Grade), Medical Corps, United States Navy

Sprue, a gastrointestinal disorder with some circulatory involvement, is known under a number of synonyms, such as white flux, Ceylon sore mouth, diarrhea alba, cachexia aphthosa, or chronic thrush.

Sprue is a condition occurring in the Tropics, the sub-Tropics, and, sporadically, through the larger part of the world, characterized by sore mouth and tongue, a distinct type of diarrhea, and an anemia which is usually regarded as secondary, but which frequently manifests a color index above one. Its marked chronicity and its tendency toward remission are distinguishing features.

The disease is found endemically in most of the tropical islands and countries—India, China, and Australia and, more rarely, in the Southern States.

It was first described by Hillary in 1776, but it is thought that the malady among the Cherokee Indians described and treated as "white flux" by John Bricknell, before this time, was in reality sprue.

Like many of the gastrointestinal diseases, little is known definitely as to the etiology. Musgrave showed the frequent presence of the colon bacillus in the various organs of the body in sprue, and found, in some instances, agglutination with the blood of the patient. Occasionally the streptococcus was found with the colon bacillus. In 1914 P. H. Manson-Bahr reported the occurrence of *Monilia albicans* in the lesions of sprue. Ashford continued the study of the disease in its relation to yeast and found another organism. His study was made upon a plus-2 Sabouraud media. This *Monilia* was characterized by fermenting glucose, levulose, and maltose. It did not liquefy gelatin or blood serum; it did not coagulate or render milk acid but, on the contrary, alkaline. E. J. Wood, working in North Carolina, has substantiated the findings of Ashford and named the organism *Monilia psilosis*. McCarrison, assuming that sprue was a deficiency disease, produced a condition similar to it in monkeys by feeding a vitamine-free diet.

E. J. Wood, as the result of a somewhat extensive study of sprue and pernicious anemia, on account of their similarity of symptoms, has raised the question, "Is sprue, possibly, a form of pernicious anemia?" Is the *Monilia* to be recognized as the causative agent of sprue? There seems to be a definite relation, for he has constantly been able to isolate the organism from the stools. In 40 cases which were neither sprue nor pernicious anemia the *Monilia psilosis* could not be isolated. During remission he had great difficulty in isolating

¹ From the United States naval hospital, New York.

the organism from the stool. He found no difficulty in isolating it from the gums and the teeth, especially where there was evidence of pyorrhea existing.

The intestinal tract bears the brunt of the attack, for here, chiefly, the pathology is found. The small intestine, especially the ileum, is the portion most severely affected. The gross appearance is that of a lifeless organ thinned out to a mere membrane. The diaphanous gut is found to have suffered the loss of the villi. The muscular coat is atrophied, the serous coat is usually healthy, and the submucosa has undergone rather irregular hypertrophic fibrous changes. The mucous membrane of the entire intestinal tract, from mouth to anus, is superficially eroded and interstitially atrophied. The bowel is usually covered with a layer of mucus containing yeast cells and branching mycelia. Minute spherical indurations, about the size of a pinhead, surrounded by a pigmented areola, occur irregularly throughout the gut. Upon cutting, these bodies are found to be cysts containing a gummy, mucopurulent material.

The tongue and buccal mucous membrane usually suffer. The ulcerated areas occur irregularly, distributed on all portions of the tongue as well as the buccal surfaces. Desquamation is common, being most marked on the surface of the fungiform papillæ. The epithelial cells of the tongue present a fatty degeneration.

The symptoms of sprue are variable, both in nature of severity and progress. In some instances it may be a subacute malady, running its course in a year or two; in other cases it may drag on indefinitely with intermission for 10 or 15 years. Much depends on the circumstances, the character of the disease, the care, the treatment, the age, and the intelligence of the patient.

In a fully developed case the patient, who is generally dark or muddy in complexion and much emaciated, complains of three things—soreness of the mouth, dyspeptic distention of the abdomen, and looseness of the bowels, especially urgent during the early morning hours and the forenoon. The patient also complains of being weak. Associated with this are loss of memory and inability to take exercise or apply oneself mentally. The patient is irritable with his friends.

Examination of the mouth may show lesions of somewhat variable nature. The lesions of the mucous membranes, though superficial, are very painful. They vary in intensity from day to day. During an exacerbation the tongue looks red and angry; superficial erosions, patches of congestion, and, perhaps, minute vesicles appear on the surfaces, particularly about the edges and tip. Often, due to the swelling resulting in consequent folding, the sides of the tongue appear fissured. The filiform papillæ can not be made out, although, here and there, fungiform papillæ may stand up, pink and

swollen. If the tongue is turned up, superficial red patches, sometimes covered with an aphthous looking pellicle, may be seen on either side of the frenum. Upon eversion of the lips similar patches and erosions are visible, and if the cheeks be separated from the teeth the same may be seen on the buccal mucous membranes. Occasionally the palate is similarly affected. Very often in this area the mucous follicles are enlarged, shotty, and prominent. The gullet and uvula may also be congested and, in places, raw and sore.

As a result of the irritation caused by these superficial lesions, the mouth tends to fill with a watery saliva which may dribble from its corners. If the patient attempts to take any acrid food, strong wine, or any food except a bland diet, the pain and burning of the mouth are intolerable, so much so that, although the patient may be extremely hungry, he shirks eating. Often swallowing is accompanied with a burning sensation under the sternum, suggesting that the gullet also is in a raw, irritated condition. At all times the tongue is abnormally clean and devoid of fur. During an exacerbation it is red and swollen, but during a remission and when not inflamed it is small, pointed, and, owing to the anemic condition of the patient, may be yellowish like a piece of cartilage. Apparently the tongue condition may be the sole symptom and may persist for years before the characteristic diarrhea supervenes.

Dyspepsia is usually much complained of, the feeling of weight, oppression, and gaseous distention after eating being somewhat excessive. Very often the abdomen swells like a drum and unpleasant borborygmi roll through the bowel. At times there may be vomiting, sometimes coming on suddenly and not always accompanied by a feeling of nausea.

Anemia, varying in degree according to the severity of the attack, is found. In the severe cases a pernicious type with alterations in the size and shape of the erythrocytes and the appearance of normoblasts is often found.

Two types of diarrhea are associated with sprue—one, chronic and habitual, the other, more acute and, in the early stages, evanescent. The former is characterized by one or more daily discharges of a copious, pale, grayish, pasty, fermenting, acid, mawkish, evil-smelling material. The latter is of a watery character, also pale and fermenting, the dejecta containing undigested food and, usually, an abnormally large amount of oil and fatty acids. In these latter circumstances the diarrhea usually brings with it considerable relief to the dyspeptic distention for a time. When the mouth is inflamed, the diarrhea is usually more active. The stools, during quiescent periods, may be confined to one or two in the early morning or afternoon; during the latter part of the day the patient is not disturbed. The stools, however, even during this quiescent period,

are always extraordinarily copious, the excessive bulk being due to the excess of fat and the microscopic air bubbles. They are passed usually without pain.

The progress of sprue depends upon the duration of the disease, age of the patient, and cooperation of the patient in the treatment. In an early case, with a patient under 50 and with proper cooperation, the prognosis is good.

Probably the most efficacious treatment of the disease is a properly regulated milk diet. The interval between feeding is two hours. The milk should be given warm, through a glass tube, very slowly. The amount is gradually increased until as much as 3 quarts in 24 hours is reached. The patient is to be confined to bed. In a severe case it may be well to start with skimmed milk, increasing the amount as rapidly as possible, and then adding a little cream in half-ounce portions.

After all symptoms have ceased and convalescence has been well established for several weeks, a soft diet may be cautiously started. The diet should be sugar free if possible; however, if it is necessary to add sugar, lactose should be used.

If the patient refuses milk, a beef diet may be used, but only when the patient can not take milk. The tender beef, finely chopped, is made into balls and cooked on a hot iron on top of the stove as lightly as the patient will permit. To begin with, the amount is usually 1 pound in four divided portions, with the sole addition of hot water.

CASE REPORT

I. M. J. Admitted to the hospital February 15, 1925, complaining of alternating diarrhea and constipation, lassitude, and stomach trouble. Patient stated that he was able to eat only green food and fruits.

Habits.—Patient denies the use of narcotics and alcohol. He uses coffee three times a day and smokes one package of cigarettes a day.

Family history.—Irrelevant.

Past history.—Had usual childhood diseases. Malaria in 1920; pneumonia in 1918 and 1919; tonsillectomy in 1920.

Present illness.—Was on duty as a radioman in Porto Rico when the present trouble began in September, 1923. The first symptom was diarrhea of a watery, frothy nature. The stools were at first at hourly intervals, but at the end of two weeks they had increased to two to three per hour with some burning sensation upon passage. Simultaneous with this, hyperemic sores appeared upon the edges of the tongue and roof of the mouth. Brown spots appeared and disappeared at daily intervals on the skin over various areas of the body.

His appetite was poor and memory was bad. There was a general feeling of lassitude, but patient remained on the watch list. Eating soon became so painful that the patient was able to take only liquid foods, chief of which was milk. Milk caused borborigmi, with the passage of the food in two to three hours.

The patient was referred by the attending physician to Doctor Ashford, who diagnosed the condition as sprue, and sent samples of feces and blood to the Tropical Institute of Medicine, where the *Monilia psilosis* was isolated. The patient was placed upon a sugar-free and fat-free diet. Milk was given every two hours. Along with this treatment a course, consisting of 10 injections at weekly intervals, of sprue serum was given.

After one week of this treatment the diarrhea began to subside and alternate with periods of constipation.

The patient became progressively better until February, 1924, when he suffered a recurrence of the symptoms. All this time patient had remained on a dietary treatment. A second course of serum treatment was then given. Recovery this time was slower than after the first attack.

The patient was then surveyed from the Tropics and sent to the United States naval hospital at Brooklyn. Here he was placed on a soft diet and pancreatin (10 grains) was given three times a day. He was discharged to the third naval district, greatly improved, to serve the rest of his enlistment. He was discharged from the service in September, 1924. On account of his physical condition he was denied the privilege of reenlistment and was given temporary total disability.

In the meantime he has worked as a radio inspector, but his physical condition has been such that he was not able to work steadily.

In January, 1925, he was again bothered with diarrhea, this time less watery but of a frothy nature. He also suffered a loss of appetite and from general lassitude. He reported again to the United States naval hospital on February 20, 1925.

Physical examination.—Patient was found to be a poorly nourished male; age, 25 years; weight, 115 pounds; height, 62 inches; skin, bronzed.

Mouth.—Tongue coated and swollen, with numerous areas of hyperemia appearing in several places which are very tender.

Chest.—Thorax normal in size and shape; movements normal. There were no areas of dullness upon percussion. Vocal fremitus was not impaired. Breath sounds were roughened.

Abdomen.—Slightly distended; no masses palpated; generalized tenderness throughout.

Rectum.—Normal.

Reflexes.—Normal.

Blood.—Normal, with a hemoglobin of 95 per cent.

Treatment.—The patient was placed on a milk diet and showed gradual improvement. He was given 10 grains of calcium lactate and one-tenth grain parathyroid three times a day. Efforts to isolate the *Monilia psilosis* were unsuccessful from both the feces and the gums.

At present he has one to two stools per day, which are moderately well formed and show a slight amount of fermentation. His general condition is good. The patient has been discharged from the hospital and advised to return at weekly intervals for observation.

TREATMENT FOR WARTS OF THE FOOT

By J. MARKEY, Lieutenant (Junior Grade), Medical Corps, United States Navy

Excepting perhaps the ubiquitous and ever-annoying ingrown toenail, the most troublesome foot affliction and the one most frequently met with in Marine commands is the so-called papilloma of the sole, *verruca plantaris*. This seems particularly true for marines on the Asiatic station. A dozen cases, fully half of all the foot complaints arising during the past three months in the Legation Guard at Peking, were from this distressing source.¹ Six of the cases were of over a year's duration when discovered by our inquiry.

Diagnosis of the condition is easily and often missed because of the obscurity of the symptoms. Most of the patients complain of a generalized aching in the foot, accompanied by a soreness and stiffness of the musculature of the lower leg. The subjective sensations are many times described as identical with those provoked by a collapsing or weakening arch.

The more pronounced cases call attention at once to the real seat of the trouble—a small spot on the sole of the foot acutely tender to direct pressure. The soreness of the leg arises from a spasmodic compensatory effort of the leg muscles to take pressure from the area involved.

Objectively, if the lesion has never been treated there is nothing to be observed by an ocular examination. Upon palpation, however, an area of the covering horny layer of the sole is found to be harder and smoother than the surrounding skin. Usually a pea to filbert sized nodosity can be felt under the thickened epidermis, which is movable upon the surface of the metatarsals. If the area has been treated unsuccessfully by caustics, the spot is marked by a small, concave, pinhead-sized plaque sunk into the epidermis.

¹ The strength of the organization varied between 450 and 600.

In all our cases the point of maximum tenderness and usually the nodosity itself was found in the middle of the ball of the foot at a point which varied from directly over the distal metatarsal of the big toe to between the first and second toes. It could in most cases be rotated in a circle, limited by the action of the epidermis, over the metatarsals of both toes. It showed no preference for either left or right foot. None of the cases had more than a single lesion.

The identity of these lesions with the wart family has been noted by many authorities. Each individual case can easily be differentiated from either a small abscess or a corn by incising or slicing with a sharp scalpel.

At Peking, in a case particularly resistant to treatment, the growth was removed by dissection, and a histological examination revealed its warty character.^{2 3}

Contrary to the findings of Hardaway and Allison⁴ that the condition is most frequently seen in malpositions of the feet, flat foot, and Morton's foot, our cases all occurred in otherwise normal extremities.

We were unable to determine any common cause. There is evidence that the condition is mildly contagious,⁵ and a specific organism has been found which produces like lesions in rabbits.⁶ It has also been suggested that the growth is the result of a long-continued irritation by some small foreign body introduced into the epidermis. The reaction of the tissue to this and the added influence of sweat, heat, pressure, uncleanness, and the friction to which the soles of the feet are subjected (especially under the emergency conditions confronted by marines) would provide adequate cause, it is thought, for the creation of a warty ingrowth by the skin.

If the infective theory can be upheld on the strength of the evidence given, however, it is apparent that the elements set forth

² This patient suffered a recurrence two weeks after the removal of what we supposed was the entire wart. The process was later cleared up completely with the treatment given in a subsequent paragraph.

³ Our pathologic report was returned with the notation "Wart." Dubreuilh and Bowen, as cited by Stelwagon, H. W. (*Diseases of the Skin*, eighth revised edition, p. 581), are in accord as to the following: "The epidermis at the periphery shows pronounced acanthosis, papillary enlargement, down growth of the rete plugs, and marked hyperkeratosis, together with great hyperplasia of the granular cells; as the center is approached the middle rete cells become vacuolated, appearing larger and rounder than their neighbors; in many of the warts were seen peculiar protozoa-like bodies in many of the nuclei of the rete cells, probably some form of nuclear degeneration. Bowen found no particular deviation in the corium."

⁴ Hardaway and Allison: *Cutan. Dis.*, 1906, p. 127.

⁵ Payne: *Brit. J. Derm.*, 1891, p. 184; Morrow, Allen, and Bronson: *J. Cutan. Dis.*, 1899, p. 183; Vives: *J. mal. cutan.*, 1899, p. 463; Jadassohn: *Verhandl. der Ver. deutsch. Derm. Gesellsch.* (1895), 1896, p. 497; Varlot: *Jour. de Chn. et de therap. infant.*, 1894, No. 34, p. 529; Lanz: *Corbl. f. schwelz. Aerzte*, 1898, p. 264.

⁶ Kühnemann: *Monatsh. f. prakt. Dermat.*, 1899, Vol. IX, p. 17; Schweninger: *Ibid.* p. 380.

would make extremely favorable media for the action of bacteria entering into the rete through a minute fissure or foreign-body pathway.

We were unable to place any blame on shoes or socks. The cases all washed their feet on the same cement floor of a shower bath.

The form of treatment we found most effective in all cases was modified from that of various authors with devices of our own. It was local only, as follows:

The foot was thoroughly cleansed with green soap and water. The area of the ball of the foot surrounding the nodosity was painted with collodion (to protect the normal epidermis from the continued action of drugs). The thickened epidermis was cauterized with fuming nitric acid or a strong solution of caustic potash. When a hole which approached the diameter of the callosity had been eaten away to a depth at which the patient first complained of pain, it was filled with a 15 to 20 per cent salicylic acid ointment. A felt corn plaster of nearly 3 inches diameter having an aperture of half an inch was then taped over the treated area. An additional reservoir of ointment was placed in the opening of the plaster if the foot was to receive only one dressing a day. Each morning the entire dressing was removed. The loose detritus and dead tissue were gently scraped away and the ointment applied as before.

The ordinary case will require only six or seven applications of this type, whereas in obstinate cases the treatment may have to be continued for a fortnight or longer. The lesions are prone to recur if treatment is not persisted in until the last vestige of the papilloma is removed.

From a service standpoint it will be seen that this method possesses the virtue of allowing the patient to continue using his foot during the whole course of treatment. The corn plaster from the beginning permits him to bear his full weight upon the foot and eliminates at once the fatiguing spasmodic protection of his dorsal flexors.

We found that using the plaster alone caused an immediate cessation of symptoms and a decrease in the size of the nodosity in from one to two weeks. The lesion recurred immediately, however, when the protective pad was removed. The same process obtains when the patient is confined to his bed for any reason.

Although the foregoing method was the only one upon which we could place reliance, processes recommended by other writers were tried in developing it.

One advocated by Stelwagon³ is given as follows:

"The calloused covering is first removed by paring or by a few days' application of salicylic acid plaster or a 25 to 30 per cent ointment continuously applied" until the outer surface could be curetted

away. "The cavity thus formed is filled with salicylic acid and over this painted several coatings of an 8 per cent salicylated collodion," this latter operation being repeated one to three times at intervals of several days or a week.⁷

Bowen uses 10 per cent chrysarobin with the salicylated collodion.

Our experience was that both these methods were extremely painful to the patient, the curetting particularly. In most cases they were unable to do duty until the treatment had progressed a week or 10 days. Usually they experienced so much discomfort from the process that they finally refused to take more treatment. We thought the high strength of salicylic acid continuously applied possibly provoked much of the pain.

To remove this feature, it has been recommended that the caloused area be painted with deliquesced trichloroacetic acid, pared, and finally the acid applied to the wart itself.

Thirty to sixty second applications of a carbon dioxide snow pencil may be administered, reapplying for a like length of time with a smaller pencil and following with boric acid.⁸ Others recommend electrolysis, X ray, and the correction of foot deformities and malpositions.

We have had no experience with these latter methods, but as they are not available to most marine detachments nor on board ship they need hardly be considered for the service.

There is apparently a goodly-sized literature upon the constitutional treatment of the condition, with conflicting reports of the value of individual drugs. Arsenic, magnesium sulphate, nitromuriatic acid, and mercury have been used. Two writers⁹ believe that the benefit to be derived from internal medication, especially from magnesium sulphate, is due to the purgative action.

The method indicated as our preference is so simple and has proved so effective in clearing up the lesions that we have found the more involved methods and internal treatment unnecessary.

HEADACHES¹

By H. E. LIST, Lieutenant (Junior Grade), Medical Corps, United States Navy

In the early ages of medicine headache was looked upon as an entity and treated as such. Many vague forms of treatment were practiced, characteristic of the healing art of that day. For example, Scribonius Largus (47 A. D.) suggested the use of the elec-

⁷ Purdon: Dublin. J. M. Sc., 1899, Vol. CVIII, p. 99, commends the wearing of a rubber covering for its macerating action.

⁸ Sutton: Amer. Jour. Med. Sci., July, 1912, p. 71.

⁹ Watson: Brit. J. Derm., 1903, p. 178; Hall: *ibid.*, 1906, p. 106.

¹ From the United States naval hospital, New York.

tric ray fish. But with the advancing years and the gradual development of the practice of medicine into a science it was found that headache was due in some instances to existing pathology or disturbed physiology elsewhere, and among the first symptomatic headaches recognized were those resulting from alcoholism and epilepsy. The march of progress continued, and the relationship of headaches to other bodily disturbances became more and more firmly fixed until we now regard this condition always as a symptom and not a disease and treatment means fundamentally a diagnosis of the cause and the application of measures directed to the removal or modification of the cause.

The classifications of headaches are many and, perhaps justifiably, somewhat confusing.

Some writers choose to consider them as primary and secondary; others, organic and functional; while still others prefer to discuss them as extracranial and intracranial. Such categories may be accepted or rejected, according to individual viewpoint, since it is the cause and not the type which is the all-important factor.

Headache is associated with more diseases than any other one symptom, but, even though it is so commonly found, may be the guiding hand as to its etiology and the diagnosis if a thorough and conscientious investigation of it is made. It is, as a rule, more or less constant, according to its cause, and, though unpleasant from the patient's standpoint, is a very valuable adjunct in the symptom complex. For example, if there were no headache associated with brain tumors (although brain tumor may exist without headache) the mortality of these cases would be much higher, due to the fact that the patient himself would not recognize the fact that something was wrong until other symptoms appeared. This is also true concerning headaches due to refractive and accommodative disorders of the eyes, in which the brain symptom is often the most prominent and sometimes the sole symptom of the eye trouble, the strain thus being interpreted solely by frontal or occipital headache. It is one of the most important subjective symptoms we have.

It is important to determine whether the headache is due to a local or to an extraneous disturbance. The headache may be the result of pathology existing at the site affected, as, for example, a neuralgia, or it may be the result of pathology existing elsewhere, such as is found at the onset of an infectious disease. Moreover, there may be no demonstrable pathologic findings, since it is true that a great many headaches that come to the doctor are due to functional nervous derangement—the headache found in neurasthenia and hysteria. Another general cause of headache is

personal or bodily abuse or neglect, the result of fatigue, bad air, hunger, errors of diet, constipation, eye strain, and alcoholic indulgence. We also find the headaches which are classed miscellaneous, such as those which are found in menstruation, adolescence, and following spinal puncture. Occasionally we find a patient with a headache to which no cause can be attributed, and these we call idiopathic. Fortunately this last group is becoming smaller and smaller. Lastly, we may be dealing with a malingerer, and in such the existence of the headache is very difficult to disprove, since it is entirely a subjective symptom.

Headaches due to local causes.—Among the headaches due to local causes, the neuralgias are the most frequent, the most persistent one being of the trigeminus. The trigeminal neuralgia is seldom considered to be a headache unless the supraorbital branch is the one involved, in which case it is necessary to differentiate it from a migraine, brain tumor, pachymeningitis, neurasthenia, eye strain, or a frontal sinusitis. The pain is jumping in character and unilateral, and the supraorbital foramen shows an exquisitely tender point. A plotting of the area involved will serve to solve the diagnosis, since it would follow the distribution of the nerve.

Headaches are constantly found in the meningitides, whether they be luetic, tuberculous, cerebrospinal, or pyogenic. They are very severe, usually occur early in the disease, and may be the only existing symptom. The condition may be confused with brain tumor or abscess, but careful examination of the eye grounds and the spinal fluid should serve as a ready means of differentiation.

The so-called "indurative" or "rheumatic" headache is not so uncommon. It is essentially a myalgic condition, the distinguishing feature being painful indurations at the tendinous aponeuroses of origin and insertion of the neck muscles, particularly in the region of the occiput. It is considered by some to be a chronic myositis, since small nodular swellings at the muscle extremities may be found. Others maintain that it is a neuralgia. This type of headache is also very severe and may be confounded with that of a brain tumor, since there are frequently pronounced symptoms from the excessive pain.

Another type of headache which is frequently found, but little understood, is that which may be spoken of as a muscle or occupational neurosis. Among this group are the eye strains, ear strains, neck strains, and position strains resulting from a continuous functioning of particular groups of muscles, with the result that they become fatigued. The headaches are most frequently frontal and occipital. They are persistent and come on more or less gradually, becoming more intense as time passes. They are usually associated with occupations.

Headaches from regional foci of infection, such as the nose, tonsils, ears, and sinuses are common. As is well known, acute swelling of the nasal mucous membranes gives rise to a heavy feeling in the head, and this is often interpreted as a dull headache. Oftentimes the sinuses become obstructed, either by excessive exudation or the presence of nasal polypi, resulting in a headache. Sinus headaches tend to start with a mild or dull pain and increase more or less rapidly to an almost unbearable intensity. They are strikingly ameliorated by the reestablishment of sinus drainage. It should be remembered that each or all of the sinus lesions may cause general headache, and that chronic sinusitis may be quite silent except at intervals when, through a coryza, an acute or subacute process supervenes and blocking occurs. Headaches resulting from ear disease usually appear as earaches or mastoid pain. The parietal region is the site usually affected, although the pain may become very widespread.

Bone and periosteal headaches are relatively uncommon. They occur as complications of caries, syphilis, gummata, and in trauma. They are usually closely localized. Palpation and tenderness to pressure help to establish the diagnosis.

Increased intracranial tension, such as is produced by a tumor, by an abscess, by hydrocephalus, or by pressure from without, invariably produces headaches. Although it is pretty generally agreed that cerebral structures are insensible to certain types of stimuli (the same as the ear is insensible to light stimuli and the skin to smell stimuli), the sensibility to the stimulus of deep pressure is well recognized and is responsible for many.

Headaches as ordinarily seen by the ophthalmologist may be considered from three points of view—(a) organic disease of the eye, (b) retinal irritation, and (c) eye strain. Eye strain may be due to an overuse of the eye muscles, or it may be due to an error in refraction. There can be no question, however, that eye strain as a direct cause has been much overestimated and that occasionally a neurasthenic complex enters in.

The headaches of migraine are essentially nervous in origin, are very severe, and recur at irregular intervals. The headache is the result of a vasomotor disturbance, as is evidenced by the presence of other phenomena, such as a flushing of the side of the face affected, followed by a pallor. A dilatation of the pupil on the affected side, followed by a contraction, is also sometimes observed. Some consider it a degenerative neurosis, some regard it as an epileptic equivalent, while others attribute at least some of the cases to anaphylaxis. It is correctly designated a hemicrania, since only one side of the head and face is affected. Heredity plays a very

important part in its etiology. Contributory factors are (a) the indulgences in excesses, (b) emotion or mental overstrain, (c) fatigue, and (d) defective elimination of waste substances. The headache is unilateral, usually right sided, and sharp, stabbing, or boring in character. Nausea and vomiting are common symptoms. Movement, light, and sound increase it.

Headaches due to extraneous causes.—There are many extraneous conditions which produce headaches. Post-influenzal and post-malarial toxemias are frequent causes, while intestinal parasites, the leukemias, and diabetes are occasional causes. The headache resulting is nearly always supraorbital. The anemias and chlorosis may give rise to quite severe head symptoms. They are usually continuous and as a rule involve the entire head. Gastrointestinal headaches are common, are for the most part reflex in type, and are mostly frontal. They are the result of indigestion, constipation, chronic gastritis, and hunger. Syphilitic headaches, while caused locally by the presence of gummata or a meningitis, may also be the result of the generalized infection and may be seen as early as during the appearance of the rash. They are, as a rule, occipital in location and intermittent in character, are usually worse at night, and may entirely disappear during the day. Nephritic and uremic headaches are common and are caused partly by toxemia and partly by alterations in cerebral circulation. It is doubtful, unless hypertension coexists, whether arteriosclerosis is ever a cause. Chronic poisoning by lead, alcohol, arsenic, iodine, copper, opium, and many other substances may give rise to persistent headaches. The encephalitis of the metals is most frequently complicated by a severe nephritis, which in turn contributes to the headache. They may be mild or extreme, according to the severity of the toxemia. They are usually occipital or basal.

Some have given credence to the existence of pelvic disorders as a cause, but it is now generally conceded to be doubtful whether a headache, directly dependent upon uncomplicated pelvic disease, really exists.

Fatigue and bad air are often the causative factors, as is proven by the disappearance of the headaches after rest, food, and fresh air. They are thought to be due to fatigue poisons.

Headaches due to functional nervous disorders.—A large group of headaches fall under the general class of psychogenic and psychotic headaches. Some may be due to so-called mental dyscrasias—the “excuse habit” headaches—and are developed either as an habitual selfish reaction to avoid exertion or as a defense interposed in response to any interference with individual egoistic plans. They are no less than pernicious and are always found in a self-indulgent type of individual who will say “My, I have such a

headache" and then will resort to the use of a drug or to liquor, a sordid novel, or a lazy hour of repose. These cases are trying, difficult to handle, and always vexing to the good nature of any conscientious practitioner. Mankind is constantly excusing itself for its inefficiencies and deficiencies, and the easiest place to lay the blame is on a headache.

The headaches of the neurasthenic are real, but must be accompanied by other definite signs to be really established as such. They are more usually the result of emotional factors—the anxiety neuroses—than of overwork, and are always associated with toxic or fatigue factors. There is a sense of heavy weight, which is usually occipital but may be located anywhere in the head. They are usually worse in the morning and are aggravated by exertion or emotion, and the patient is usually irritable.

The headache of hysteria is not frequent. The classical clavis—a sharp, boring pain in the vertex—is characteristic, but there is no typical headache found in this condition.

In the mild types of manic depressive psychosis the mental depression is often projected by the patient upon his bodily organs, with a resulting complaint of gastrointestinal disturbances and pains in the head. These headaches are indefinite in character and location and are more or less significant in that they reflect the mental attitude of the patient, since he himself, as a rule, is more or less reticent.

The headaches of dementia precox are also significant and often diagnostic. Many of these patients complain of an empty-headed sensation. They usually have an interesting and complex explanation, and some can even draw a picture of it. It is the headache which reflects the beginning of habit disorganizations and shut-in personalities.

Examination of the patient.—In the examination and observations of patients one should note the location of the headache. Ocular headaches often begin or center near the eyes. Ear disease usually causes pain which is located at or radiates from the initial focus. Antrum or sinus inflammation produces pain over the affected area.

The character of the pain is important—as, for instance, in the neurasthenic type, where a sense of constriction around the head is found.

The severity of the pain is helpful in the diagnosis—as, for instance, in tumor, meningitis, syphilitic periostitis, and migraine.

The determination as to the time of occurrence is an aid in establishing a diagnosis. Frontal sinus disease is characterized by a headache which often occurs at the same hour each morning, lasts a certain time, and then passes off.

Other important factors in the examination are radiation of the pain, duration, local tenderness, hereditary predisposition, and the effect of internal and external medications.

In all questionable cases there should be a thorough examination of the eyes, nose, ears, and accessory sinuses, a temperature record, a blood-pressure measurement, a urinalysis, and a palpation of the insertion of the neck muscles at the occiput.

The treatment of headache has been purposely omitted, for, since this is a symptom, it logically follows that a removal of the cause means a cessation of the pain.

VERTIGO¹

By G. C. MAIN, Lieutenant (Junior Grade), Medical Corps, United States Navy

The word "vertigo" is from the Latin, "vertere," meaning to turn. It is defined as "any movement or sense of movement, either in the individual himself or in external objects, that involves a real or seeming defect in the equilibrium of the body, and is associated with more or less disturbance of consciousness."

In the practice of medicine how often the patient complains of dizziness, giddiness, or a "light-headedness." Among the general conditions we are called upon to relieve, this symptom probably leads in frequency. But like headache, for example, vertigo is merely a symptom, a manifestation of some underlying and often obscure condition for which we must search. As a rule it is temporary and unimportant, depending on some such condition as impacted wax in the auditory canal, eye strain, asthenia, etc. In young persons the above is particularly true; in old persons it is more often the manifestation of some more serious disorder.

Persistent vertigo, not distinctly associated with the accessory sinuses, the eye, the ear, digestive disturbances, or asthenia, demands a thorough investigation of the heart and blood vessels, the urine, and the reflexes, the possibility of syphilis, epilepsy, or even brain tumor, and should call for an examination of the fundus oculi.

Dizziness is usually sudden in onset and intermittent in type. Attacks may often be brought on by a sudden change in position, whatever the cause. It usually takes the form of a subjective sensation of whirling or falling. Objective manifestations, such as uncertain staggering gait, may accompany the subjective, though not often.

The human organism, except in recumbency, must constantly be kept in a state of balance or equilibrium. This is accomplished by a fully coordinated and complex system of muscular contraction. The motor impulses necessary to cause these contractions to secure

¹ From the United States naval hospital, New York.

equilibrium are determined in the cortical centers by sensory impressions received from the eye, semicircular canals of the internal ear, from the skin, or any other part of the body that may come in contact with external objects, and from joint surfaces and the muscles controlling them. These impulses go to the cerebellum, and anything that disturbs their transmission or reception causes a derangement of the synergy of the motor impressions, which is manifested by vertigo. The nausea, vomiting, and irregular pulse, which may be coexistent with the vertigo, are due to reflex irritation of the vagus nerve.

Vertigo as a symptom may be classified according to the type and the cause. Of the former there are two groups, relatively easy of classification and relatively unimportant. Dizziness may be said to be subjective or objective. In the subjective form the patient feels as if he were whirling rapidly about, and in the objective he feels that objects are whirling around him or are moving up and down. Again, vertigo may be said to be general or special. In the latter, objects appear to move or the patient tends to fall in a given direction. Special vertigo points to a lesion of a particular semicircular canal.

The classification of vertigo from the standpoint of the cause presents the greatest difficulties and at the same time is of more importance and interest to the clinician.

Among the most interesting types of vertigoes are those resulting from a sudden change in position. Temporary vertigo of a severe nature may readily be produced in a healthy individual by prolonged movements of rotation or swinging or sudden and rapid horizontal movement. In this class also fall the vertigoes of seasickness, train sickness, etc. Some individuals are particularly susceptible to these changes. Under ordinary conditions some persons are quite sensitive to the effects of a vertical position, especially if unaccompanied by any mental or muscular exertion, and may suffer from dizziness in consequence of a fall in the general blood pressure. Persons who have been kept in bed for long periods of time suffer from giddiness when they first attempt to stand or walk. This is probably due to a sudden fall in the general blood pressure, due in turn to the gravity effect of drafting a large amount of blood into the splanchnics. Because of the long inactivity, this sudden shift in the blood volume is not compensated for by the vasoconstrictors and the muscles of the abdominal wall.

Vertigo from any cause usually disappears or is greatly relieved when the patient is lying down. Sometimes, however, notably in the arteriosclerotic form, it is increased by lying down. The dizziness which most people feel when at some high place is most likely

ocular in origin and depends upon the sudden cessation of visual impulses from near objects.

Vertigo due to the existence of asthenia covers by far the greater number of persistent or persistently recurrent cases in persons under 40 years of age and is often associated with digestive trouble, cardiac overstrain, eye strain, anemia, hysteria, malnutrition, or the habitual use of stimulants and narcotics.

Meniere's disease, supposed to be due to disease of the labyrinth or semicircular canals, always has vertigo of a severe nature as a symptom, associated with tinnitus aurium, and a tendency to fall to the left or right. The vertiginous attacks are sudden and severe and may last from a few seconds to several hours. Nausea, extreme pallor, and, in rare instances, even transient unconsciousness or temporary collapse may accompany the attack, which may occur several times daily or be separated by months of immunity. True Meniere's disease is rare.

Eyestrain due to overuse, errors of refraction, or ocular insufficiencies may be a cause of vertigo.

A derangement of the cerebral circulation, causing either a hyperemia or an anemia, nearly always produces vertigo. The former type may occur in mitral disease and in women at the time of the menopause; the latter, in aortic disease, fatty heart, and arteriosclerosis, when it may be the premonitory sign of impending thrombosis. Arteriosclerosis and cardiac disease are the causes of vertigo in the majority of cases observed in elderly people. It is important as related to exacerbations of high arterial pressure and the threat of apoplexy, to aneurysm, aortic regurgitation, arteriosclerosis, arterial spasm, and other cardiac lesions and cerebral disturbances due to other causes.

Brain and cord lesions, brain tumor, abscess, meningitis, cerebellar and pontine lesions, cerebral syphilis, cerebral thrombosis, general paresis, locomotor ataxia, and disseminated sclerosis may be associated with varying degrees of vertigo. Intracerebellar tumors cause a vertigo in which the sense of rotation of the body is in the same direction as that of the apparent movement of external objects—away from the side of the lesion. In extracerebellar tumors, while external objects appear to move as above, the subjective sense of rotation is the reverse—toward the lesion.

Vertigo always accompanies epileptic seizures and is frequently associated with the neuroses and hysterias. In epilepsy the vertigo may be represented as an aura of a major attack or represent an attack of petit mal. Constipation is frequently responsible for recurrent vertigo and pseudoepilepsy in spasmophilic cases. In ordinary vertigo and in the pseudoataxia of hysteria, muscular incoordi-

nation usually disappears in recumbency. It may be at times impossible to detect feigned or spurious vertigo, though here, as elsewhere, close observation may result in catching the patient off guard.

Vertigo is frequently a symptom in such general diseases as auto-intoxication, gout, nephritis, febrile states, extreme weakness, cachexia, and in the convalescent stage of acute diseases. Vertigo is often a prominent feature in uremia and is usually associated with periods of high arterial tension and diminution of total solids.

Vertigo is often due to reflex irritation, as auditory vertigo due to conditions other than Meniere's disease, such as eardrum pressure; nasopharyngeal vertigo, due to pressure within the nose or accessory sinuses; laryngeal vertigo, associated usually with a coughing fit in laryngeal affections.

The habits in relation to the use of tea, coffee, tobacco, alcoholics, and the question of sexual excesses must be fully investigated in searching for the cause of a given case of vertigo.

Heat stroke and sunstroke, blows on the head, sudden severe pain, the sight of blood, offensive odors, and a variety of other traumatic agents may be responsible for vertigo.

Gastric disturbances are held accountable for one of the commonest forms of vertigo, a contention that is not borne out by actual physiological and clinical investigation.

The correct interpretation of vertigo presented as a given symptom can be arrived at only by considering all the possibilities in a thorough, systematic manner and by studying its relation to other symptoms and clinical findings.

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CLINICAL NOTES

DEATH FROM CHRONIC MERCURY POISONING FOLLOWING ANTILUETIC TREATMENT—REPORT OF A CASE¹

By C. D. MIDDLESTADT, Lieutenant (Junior Grade), Medical Corps, United States Navy

Volumes have been written about syphilis and acute nephritis, their diagnosis and treatment, and their occurrence together. Therefore, it is not the purpose of this report to bring forth anything new, but to endeavor to point out a few facts.

These facts are all well known, but they are brought together in order to aid us in preventing the recurrence of a similar case.

CASE REPORT

J. S. M., pharmacist's mate, second class, age 28.

Family history.—Not obtainable.

Past history.—Patient has had malaria, rheumatism, gonorrhea, orchitis (acute, nonvenereal), influenza, and syphilis.

His syphilitic history is as follows: Exposed, July 20, 1923; primary sore appeared August 1, 1923; Wassermann reaction, 4 plus, August 14, 1923; generalized secondary eruption, August 15, 1923. In October, 1923, patient complained of severe pain in both temples and severe post-orbital and frontal headaches. He was admitted to this hospital with "diagnosis undetermined" on October 21, 1923, and sent to the eye department to determine the cause of his orbital and frontal headaches. All examinations, including eye grounds, nasal accessory sinuses, and dental examination were negative. Refraction was done and lenses prescribed for correction of error. No intraocular pathology was noted. The patient was very irritable, and observation of his reflexes showed inconstancy and some spasm of the postcervical muscles.

Because of the history of syphilis and physical findings, a spinal puncture was done October 30, 1923, with the following results: Fluid under slight pressure; Wassermann, 4 plus in all dilutions; cell count, 722; globulin increased; colloidal gold reaction, positive luetic curve.

Three months before this the patient had received eight injections of neosalvarsan, and one month before his blood Wassermann was

¹ From the United States naval hospital, New York.

negative. The blood Wassermann on November 13, 1923, was 4 plus. It was noted at this time that the patient's efficiency in his rating had decreased very perceptibly. Prior to this time he had been considered a very efficient corpsman. His diagnosis was changed from "undetermined" to "syphilis," and he was transferred to the genitourinary department for further treatment.

It is well to note at this time that his urine presented evidence of a kidney lesion as early as November 15, 1923. The report showed many hyaline casts, leucocytes, and calcium oxalate crystals. His complete blood count was: Red blood cells, 4,848,000; hemoglobin, 100 per cent; white blood cells, 10,200. After three injections of salvarsan, combined with mercury inunctions, he was sent to duty under treatment November 25, 1923.

From this time we have no record of the patient's antiluetic treatment, nor of his condition, except that we are told that he complained of severe headache and that he continued on mercury inunctions for an indefinite period, acting more or less as his own physician.

His record, which is very incomplete, shows that he received 20 injections of neosalvarsan and about 20 injections of mercury. He was transferred November 1, 1924, to the U. S. S. *Marblehead* for duty. Later he was transferred to the U. S. S. *Bainbridge*, where he was again admitted to the sick list because of severe frontal and occipital headaches, pain over the eyes, general malaise, and inability to perform his duties. On February 11, 1925, he was transferred to the U. S. S. *Whitney* for observation. Here the first urine analysis since October, 1923, was recorded. The report at this time showed it to be full of albumin and blood. He appeared before a board of medical survey, which recommended that he be returned to some naval hospital in the United States for further treatment.

March 7, 1925, he was transferred to the U. S. S. *Arkansas* for transportation to the United States with a diagnosis of syphilis. His complaints were intensive headache, weakness, dimness of vision, backache, and pain over the region of the kidneys, more severe on the left side.

Physical examination showed a weak, emaciated, anemic, and dehydrated patient; blood pressure, 230-160; lungs and abdomen, negative. The conclusion arrived at was that the patient was suffering from chronic parenchymatous nephritis. There were symptoms which were suggestive of advancing acute uremic intoxication, and his antiluetic treatment was withheld. He continued to complain of intense throbbing headache and was unable to retain anything taken by mouth.

Laboratory report: Urinalysis showed the presence of blood, a large amount of albumin, and many bacteria. Complete blood count: Red blood cells, 3,150,000; hemoglobin, 70 per cent (Tallquist); white blood cells, 6,700.

Treatment consisted of protoclysis, hot packs, and milk diet, with a careful check on the intake of fluid and output of urine. The average intake was from 2,100 c. c. to 2,300 c. c., and the average output of urine was from 1,200 to 2,000 c. c. His temperature remained normal. He improved somewhat and was transferred to this hospital March 14, 1925.

Upon admittance to the hospital, physical examination revealed a very weak and anemic individual in a more or less stuporous condition. He was able to recognize people after looking at them for a few moments. His mentality seemed to be clouded. All superficial lymph glands were palpable.

Heart.—Systolic murmur heard all over precordium; there was an inconstant systolic shock; heart was within normal limits of size; blood pressure, 190–140.

Teeth in very bad condition from pyorrhea.

He had been vomiting and complained of pain in the abdomen, which was thought to be due to ureteral colic.

Blood count.—Red blood cells, 2,860,000; hemoglobin, 50 per cent (Sahli); white blood cells, 9,900; neutrophils, 81 per cent; and lymphocytes, 18 per cent.

Urinalysis.—Appearance, reddish brown; cloudy; specific gravity, 1.011; reaction, alkaline; albumin, 3 plus; sugar, negative; casts, negative; leucocytes, 2 per high power field; erythrocytes, 3 per high power field; many triple phosphates.

Blood chemistry.

Nonprotein nitrogen (mg. per 100 c. c.)	93.0
Urea nitrogen (mg. per 100 c. c.)	19.0
Uric acid (mg. per 100 c. c.)	7.3
Creatinine (mg. per 100 c. c.)	5.0
Sugar (mg. per 100 c. c.)	121.0

Spinal fluid.—No increase in pressure; cell count, 34; globulin increase; colloidal gold reaction, negative; Wassermann, 4 plus in 1 c. c. quantity (acetone antigen).

A brief summary to his condition on admittance was—

- (1) Syphilis.
- (2) Nephritis acute.
- (3) Arterial hypertension.
- (4) Anemia (severe).
- (5) Teeth in bad condition.
- (6) Abdominal pathology—probably ureteral colic.
- (7) Albuminuria and hematuria.

He was placed on the usual treatment for acute nephritis, but he continued to grow worse.

March 19, 1925, the patient became very restless and delirious and it became necessary to restrain him in order to keep him in bed. He was very noisy and shouted incessantly. He gradually became worse, voiding urine involuntarily. At 8.30 p. m., March 21, 1925, patient started moaning and drawing his head back. He was very rigid and had convulsive twitchings. He continued to moan throughout the night. Later he passed into a stupor, pulse became very weak and respirations very slow and shallow. He died at 6.30 a m., March 22, 1925.

NECROPSY

Heart.—Hypertrophied but otherwise negative.

Gastrointestinal tract.—On section, peritoneum smooth and glistening; intestines slightly distended with gas and slaty blue in color. A small amount of fluid was present. Appendix normal. The blood vessels were injected, particularly in the pelvis. The stomach contained 400 c. c. of chocolate-colored fluid. The mucosa was smooth and there was no evidence of ulceration, but there were punctate hemorrhages over the lesser curvature and a few scattered throughout. It also had a slaty-blue discoloration, particularly marked at the pylorus. The duodenum and jejunum showed very marked slaty discoloration. This discoloration extended into the ileum, where it was less pronounced. Except for this discoloration the mucosa appeared normal. The ileum for a distance of approximately 2 feet from the cecum showed a very marked hemorrhagic area of the mucosa with ulcerations of the tips of the villi. The colon throughout its entire length, but particularly in the proximal half, showed a very marked hypertrophy of the lymphoid tissue and submucous hemorrhages. The gross impression was of a catarrhal colitis and the condition similar to that found in acute mercury poisoning.

Right kidney.—Weight, 130 grams. It stripped from its bed with great difficulty. The capsule stripped readily, leaving a mottled, red and white, smooth, glistening surface which was slightly granular to the touch. There were numerous punctate hemorrhages, and the lower pole had a distinct slaty-blue discoloration. On section, the pyramids were distinct. The cortex was mottled, salmon color, and averaged 6 millimeters in thickness. The pelvis was not dilated but had marked hemorrhages beneath the mucosa. Impression was of a diffuse nephritis, acute, toxic, hemorrhagic, superimposed on a chronic interstitial nephritis.

Left kidney.—Similar to the right.

Bladder.—Contracted; walls very thick. On opening it contained about 5 c. c. of very turbid urine. The mucosa was smooth with some submucous hemorrhages.

Microscopical examination of the kidney showed the following: Cloudy swelling, congestion, hemorrhage, and deposition of blood pigment. There were marked arteriosclerosis and chronic glomerulonephritis (sclerosis of the glomeruli). Superimposed on this was an acute toxic nephrosis.

The differential diagnosis in the various kidney diseases is well outlined in many good textbooks, and I wish only to point out at this time two conditions which are somewhat similar and which must be considered in this case.

The first is renal syphilis. Here we have the symptoms of acute nephritis. There is rarely any fever. The onset is insidious, usually without any pain in the back. The edema, if present, is usually confined to the face and legs. Urine is diminished in quantity, smoky, contains blood, tube casts, and much albumin. After persisting for five or six weeks the albuminuria lessens and the patient makes a good recovery. A few cases have been reported in which death has followed in from 14 to 21 days.

The picture of renal pathology in chronic mercury poisoning is that of chronic interstitial nephritis. The kidneys are small; the capsule is thickened and adheres to the dark red, nodular, granular surface and section shows an increase in resistance. The arteries are prominent, cortex thin, pyramids wasted, and pelvic fat increased. The symptoms are essentially those of arterial hypertension, which is divided into three phases, the cardiac, renal, and nervous. Among the nervous symptoms we find headache as one of the most frequent. At times a severe boring pain occurs, especially in the occipital, frontal, or temporal regions.

It seems that at times the yellow sheet which appears in our health records brings about an impression which was not its original intention. Its purpose is to call to the attention of the medical officer the fact that the individual has had syphilis and that he should see that his treatment is adequate. It certainly should not be a loophole for every medical officer to jump through for a quick diagnosis. The minute it appears we are inclined to forget that there may be some other pathological condition present besides syphilis. Such must have been the condition here, as we find no evidence that anyone even suspected any kidney condition until the patient was transferred to the U. S. S. *Whitney*. Many of his symptoms were those of nephritis, but, because he had previously suffered from headaches and because he had had a positive spinal fluid his condition was always syphilis. His blood pressure and the condition of his

kidneys were never considered, although he presented many typical symptoms of kidney disease.

This case demonstrates very well the end results of being one's own physician. The patient died of an acute exacerbation of chronic nephritis brought about by chronic mercury poisoning. As early as November, 1923, we find that the patient had a kidney lesion. He should have been under close observation of a physician for his treatment of syphilis. Hospital corpsmen, because they know a little about the routine of medicine, are inclined to overestimate their ability in prescribing their own treatment in order to keep themselves on the pay roll, which in the end may lead to a fatal termination, as we find in the case here reported.

If patients are returned to duty under treatment, we should make an attempt to keep them under very close observation and not allow them to use mercury without any discrimination.

The textbook picture of the pathology in chronic mercury poisoning is as follows: After mercury is once absorbed through the various channels by which it is administered it is not surprising to find at autopsy the most intensive diphtheritic and hemorrhagic enteritis. The kidneys present most extensive necrosis of the epithelium of the tubules, with deposition of calcium in and about the dead cells. Later, with liquefaction of these cells or their disintegration by phagocytes, the calcium becomes coalescent in irregular masses within the tubules.

While the case here reported did not show the typical textbook picture of chronic mercury poisoning, the findings, combined with the history, are sufficient evidence for the pathologist to say that it was a case of chronic mercury poisoning.

MULTIPLE SCLEROSIS—CASE REPORT ¹

By L. D. CARSON, Lieutenant (Junior Grade), Medical Corps, United States Navy

The patient, E. P., a Veterans' Bureau patient, entered the hospital with the diagnosis of tabes dorsalis, complaining of attacks of dizziness, weakness, and easy fatigability of the legs, attacks of double vision, and a staggering gait.

The patient stated that his present difficulties started in 1918 with cramps about the left knee. The knee would become flexed and so stiff that it required some considerable length of time for him to get it straightened out again. He also noted that his legs tired very easily whenever he undertook to do any work which required standing or walking. This difficulty in locomotion has been getting pro-

¹ From the United States naval hospital, New York.

gressively worse for the past three or four years. The patient's hands and arms are unaffected.

In October of 1922 he began to have dizzy spells and noted that if he turned his head sharply to the right he would become very dizzy. This sensation was much less marked on turning the head to the left. He also complained of attacks of falling at times, always without loss of consciousness. He always fell forward. These apoplectiform attacks were accompanied by continuous severe headaches, transient attacks of diplopia, and dimness of vision.

He has noted that at times things seem to waver before him. If he arises suddenly from a chair or from bed, everything seems "to go round" before him. There seems to be a bilateral hemianopsia, as the patient states that whenever walking upstairs or along a dimly lighted hallway he has to follow the wall with one hand to guide him. He does not venture forth at night because of his difficulty in vision and tendency to stagger.

The headaches which he complained of three years ago were partially relieved by glasses which were fitted to him. He described the headaches as dull and constant.

At the present time, in addition to the above subjective and objective symptoms, the patient has a very slight impediment in speech, which is not particularly noticeable and not very characteristic.

His mental attitude seems to be one of fairly constant depression, and in conversation he occasionally manifests rather explosive articulation, which is apparently unaccompanied by any emotional reaction. He has some degree of loss of concentration and, for this reason, an impaired memory for events that have just transpired. He admits that he is occasionally quite absent-minded.

On examining the patient it was found that he was a slightly stooped white male of 35 years of age who walked with a peculiarly stumbling gait. When undressing for examination and attempting to stand upon one foot, he lost his equilibrium and only arrested a fall by grasping a near-by desk top. He appeared very well nourished and of fairly ruddy complexion. No atrophies nor deformities were found.

The pupils were dilated, reacted very sluggishly to light, and less sluggishly in accommodation. The eye grounds were examined and showed a very slight pallor of the temporal side of the left optic disk. Otherwise the fundi were normal in appearance. A slight nystagmus was noted in both eyes, but no diplopia. There was marked bilateral diminution in the areas of the visual fields.

The tongue when protruded showed a very slight tremor. Two front teeth had been extracted several years ago, and the patient

inclined to the belief that his slight impediment in speech might be due to this.

Biceps and triceps reflexes were noticeably increased, as were also the patellar, adductor, and Achilles jerks. On first examination, a negative Babinski and, on second, a positive Babinski on the left was noted. A third examination on another date showed positive Babinski on the left and a right plantar reflex which was suggestive but not a definite Babinski. It was thought that there was a slight degree of ankle clonus, though this was not definite.

Coordination tests of the upper extremities showed normal position sense. Similar tests of the lower extremities (heel of one foot on opposite knee) showed a well-marked incoordination as well as a well-developed intention tremor. Purposive movements of both lower extremities showed definite intention tremor.

On standing with eyes closed the patient would fall to the back. Even with eyes open there was a tendency to loss of balance.

A bladder examination showed well-marked fine trabeculation on the posterior wall, which was taken as indicative of a central nervous lesion.

The patient was then questioned very closely as to venereal infection and denied vigorously ever having had a primary or secondary lesion. Blood Wassermann reactions which were run over a period of five years past were checked up and found to be negative without exception, as were also two previous spinal fluid Wassermans and our own spinal fluid test. There were slight, if any, disturbances in sensation in the lower extremities. Superficial reflexes, upper and lower abdominals, as well as cremasteric, were absent.

Because of negative history of specific infection repeated negative blood Wassermann tests, repeated negative spinal fluid Wassermann tests, and because of the atypical neurologic findings for tabes, the diagnosis was changed from tabes to that of multiple sclerosis. The diagnosis of multiple sclerosis was based upon the history of early spasticity and easy fatigability of the lower extremities, severe headaches, eye symptoms, vertigo, intention tremor in purposive movements of the lower extremities, and the evidence of a very diffuse central nervous pathology as evidenced by these and the other symptoms mentioned.

Nystagmus and scanning speech in this case were not sufficiently marked to be of value in establishing the diagnosis. Charcot's triad did not form the basis for the diagnosis.

DISCUSSION

Multiple sclerosis is a disease of interest to the physician because of the great variations in the clinical picture of the disease and the

frequency with which it is mistaken for other conditions. It is a disease whose incidence takes place mainly between the ages of 20 and 30, although there are a small percentage of cases which appear earlier in life. It seldom develops as late as 45 years of age. The duration may be for 20 years, and for this reason many cases are found in elderly people. The disease runs a slow course, with exacerbations and periods of apparent remission or improvement. As to the frequency of the disease there seems to be a difference of opinion between the European and American observers, the European writers declaring that it is one of the two or three most frequent of organic nervous diseases and the Americans inclined to believe that it is comparatively rare.

Georges Guillain, of Paris, states: "Next to syphilis, multiple sclerosis is the commonest disease of the nervous system. The patient is usually 20 to 30 years of age, and the primary attack passes with little attention being paid to it, the history eliciting usually merely a story of light and transitory difficulties in walking, paresthesias, or vertigo. Some months after this the patient has fatigability, difficulty in walking, unsteadiness, stiffness of the legs, disagreeable paresthesias of the hands and feet, and, perhaps, difficulty in starting micturition. To the above list of symptoms may often be added vertigo, diplopia, and diminution of visual acuity."

"Objectively there are no sensory disturbances, except a diminution of the vibratory sense in the feet. There may be nystagmoid jerks and hippus. The spinal fluid shows a negative Wassermann and positive colloidal reaction. Such is the common picture. After two or three weeks of rest the symptoms may recede, only to reappear in one, two, or three years. Then slowly, with each exacerbation, the spastic paralysis increases." Guillain's description may be taken as being as nearly accurate a summary of symptoms and course as it is possible to give.

The etiological factors in this disease remain in doubt. Strümpell advanced the theory that hereditary defects in the nervous system were the chief cause, a theory which is little favored to-day. A great many cases have followed other acute infections and chronic toxemias may play a part. Zinc, magnesium, and mercury intoxications are believed most likely to precede this disease. Syphilis is not a cause, though a positive Wassermann has been found even in apparently nonsyphilitic patients. Exposure to cold seems to be an inciting cause in many cases and is known to have an unfavorable effect upon cases. Guillain believes that the clinical characters of the disease and its pathology both indicate a diffuse infection of the nervous system. This infectious origin was first maintained by Marie in 1887. Guillain is even willing to express the opinion that

multiple sclerosis is due to a specific organism, as specific as that of rabies, encephalitis lethargica, or syphilis. But it has no relationship with syphilis. Schroeder, of Copenhagen, described intranuclear inclusions of rodlike bodies and believes the disease to be specific, probably spirochetal.

The pathology, according to Camp, consists of sharply defined areas of sclerosis scattered through the central nervous system, often affecting one part more than another, sometimes affecting only certain parts. It is this variability in the distribution of the sclerotic foci that give rise to such variations in the symptoms of the disease and contribute to the difficulty in diagnosis. There are two theories as to the pathogenesis. Marburg believes it to be a primary, essential sclerosis; a periaxial sclerotic encephalomyelitis. The most generally credible theory is that the sclerosis is secondary to an inflammatory process (Erb, Marie, Borst). The latter theory seems most likely, because primary degenerative diseases of the central nervous system are rare and multiple sclerosis is a very common disease. The sclerotic plaques are the end result of a diffuse degenerative process and probably should not be considered as the central point in the pathology, for their locations can not be closely correlated with the clinical features.

There are three places of election, these being perivascular, subpial, and subependimal. In the old plaques of two to three years duration there is fibrous neuroglia. There is, apparently, an abortive attempt to replace the conductive tissue which has been destroyed. This fibrous neuroglia does not touch the axis cylinders, which are diminished in number, reduced in size, and demyelinated. No products of active degeneration are found. In the newer plaques all the processes of degeneration are to be found. These show much lipoid debris and many phagocytic cells. The process seems to pick out separate neurons, and in one sclerotic area may be found demyelinated axones alongside of perfectly normal fibers. Not all the pathology is to be found in the plaques, there being neuron degenerations found elsewhere, more numerous, of course, in closely contiguous areas. These areas are the sites of a more active or recent process, the sclerotic plaques being really scars which have healed.

The axones are attacked early and are then swollen. At this stage they may be edematous or may only fail to stain normally with lipoid stains. The myelin sheaths are altered and surrounded by phagocytes. The vessels show perivascular round cell infiltration and phagocytic infiltration, a result of eliminating the products of degeneration. Secondary degeneration of the Wallerian type may be found, usually appearing as a pallor of the cortico-spinal tracts. A terminal type of diffuse demyelination has also been observed.

Lhermitte has shown that meningitis is an important finding, even being so marked as to resemble the pathology of general paresis. In the cord, lesions are found at the junction of the spinal nerve roots and cranial roots, especially the optic and acoustic nerves. This observation shows the similarity to the pathology of syphilis, and would indicate that the causative organism or virus is in the spinal fluid. The vascular changes, general pathology, and lesions in other organs make it appear that the disease is a specific infection.

Very little further than what has already been stated need be said about the symptomatology. It may be repeated that the diagnosis is not to be made by Charcot's triad of nystagmus, scanning speech, and intention tremor, except in a bare 10 per cent of all cases. Nystagmus is absent in 50 to 75 per cent of all cases; scanning speech is present in only 15 per cent of cases, and intention tremor is absent in about 30 per cent of Müller's reported cases which were controlled by autopsy.

There are other equally important symptoms, such as headache, which appears early and very commonly in these cases, being dull and continuous; vertigo, which is also quite common; apoplectiform attacks; transient ocular palsies; and loss of pupillary reflexes, and in 50 per cent of cases one may, by examining the eye grounds, discover a blanching of the temporal side of the optic disk.

Among motor symptoms are to be mentioned (1) early ataxia of arms or legs, which is rarely accompanied by changes in sensation in the parts affected; (2) staggering gait, which is not markedly affected by closing the eyes; and (3) these two motor phenomena are accompanied by some stiffness in the legs and an intention tremor later in the course of the malady.

Reflexes. All tendon reflexes are usually increased, and this is an early feature in this disease and one which serves to differentiate it from tabes. Along with the generally increased tendon reflexes there is, most often, a diminution or absence of the superficial abdominals and the cremasteric.

Sensorium. The sensory changes in multiple sclerosis are both slight and fluctuating. There may be severe, dull, aching pain in members affected or in the joints, shifting in location and with marked variations in intensity. Transitory patches of anesthesia, hemianesthesia, and paresthesias occur and may serve to confuse the observer.

Bladder. Bladder symptoms occur in about three-fourths of all cases. These are chiefly concerned with transitory attacks of urinary retention and a sense of difficulty in starting micturition. Cystoscopic examination shows the usual fine trabeculation and loss of tone which occurs in central nervous lesions.

DIFFERENTIATION

Transient hemiplegia may suggest hemorrhage, syphilitic thrombosis, embolism, paretic dementia, or tumor, all of which are readily differentiated by their own particular set of symptoms.

In *paralysis agitans*, the fine tremor of the hands and fingers (but not of the large joints and much less of the head), which is not increased by movement, its persistence during rest, the masklike facies, festinating speech, peculiar attitude, gait, propulsion, retro-pulsion, muscular rigidity without increased reflexes, and the advanced age are clear and characteristic.

In *syphilis*, which is a disease not of the medullary substance but of the meninges and roots, we have a more diffuse disease, characterized by more frequent insults, hemiplegia, etc., and although speech may be slow in syphilis with lesions in the pons, it is not of the scanning or jerky type of multiple sclerosis. Instead of the partial optic atrophy of multiple sclerosis, we have amaurosis, chocked disk, or, frequently, a neuritis. Mydriasis occurs in less than 1 per cent of multiple sclerosis cases and is a very common finding in syphilis. A true Argyll-Robertson pupil rarely occurs in multiple sclerosis and very frequently in syphilis. Though these points serve to differentiate them, yet a multiple sclerosis occurring in a syphilitic is exceedingly difficult to diagnose.

According to Edwards, in "Principles and Practice of Medicine," *hysteria*, more than any other disease, simulates early multiple sclerosis; the two affections often occur together and in both the symptoms are changeable. In hysteria, sensory symptoms are much more prominent and there are often limitation of the visual fields, monocular diplopia, contractures, and convulsions, but there is no optic atrophy, nystagmus, scanning speech, nor intention tremor. The movements in hysteria are often accompanied by contraction of the antagonist muscles, a most valuable aid in differentiation. The hysteric patient may imitate the Babinski but seldom will give the entire reflex picture of multiple sclerosis.

Very rarely, in cases described first by Westphal as pseudosclerosis (the autopsy showing nothing), the tremor affects the arms chiefly; the facies is somewhat rigid; ataxia and nystagmus are absent; and outbursts of anger are frequent. Syphilis is in these cases considered as a possible cause.

TREATMENT

No successful means of treatment is known. Best results have been secured by giving the patient absolute rest during exacerbations of his disease and sending him to a warm climate whenever possible.

Drugs, hydro and electro therapeutic measures are most often vain. General tonics are of little value. Injections of calomel, fibrolysin, and salvarsan have been tried with varying success. The researches of Stern of Geneva show that preparations like salvarsan probably can not pass the choroid plexus. The ultimate successful treatment of this disease probably must come from a determination of the actual infective agent or toxin, and then direction of treatment against such a specific agent.

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ACUTE INTESTINAL OBSTRUCTION COMPLICATING CHRONIC PULMONARY TUBERCULOSIS—CASE REPORT¹

By A. L. ALDRICH, Lieutenant (Junior Grade), Medical Corps, United States Navy

A. M., a Veterans' Bureau patient, was admitted to the hospital December 9, 1924, at 11 p. m., as a stretcher case, with a report from a Veterans' Bureau physician that he was an old tuberculosis case, was suffering from abdominal pain, and had been obstinately constipated for a period of four days.

Upon admission he was delirious, had marked abdominal distention, and was apparently suffering great pain. Temperature, 99; pulse 100; respiration, 38.

Palliative treatment was applied for the night and after examination by various members of the medical and surgical staff operation was decided against. History could not be obtained and admission card supplied later contained the diagnosis of "Tuberculosis, pulmonary, chronic," and "Intestinal obstruction (partial), tentative."

The abdomen was distended and rigid, painful and tender, and no peristalsis was noted. The patient was restless. The pulse continued above 100 and respirations from 30 to 40. The heart action was labored, and there was a systolic murmur present at the mitral area which was probably hemic. Breath sounds were harsh, and

¹ From the United States naval hospital, New York.

there were scattered mucous and crepitant râles present. The patient appeared very ill.

Catheterization yielded 1,600 c. c. of a heavily colored urine, with considerable relief of distention and pain. A high colonic flushing was attempted following the application of turpentine stupes, and resistance to the tube was met with about 12 centimeters above the anus. Digital examination was made and reinsertion of the tube resulted in its passage for about 20 centimeters. Irrigation produced very little mucus, a small amount of fecal material, and some flatul. The patient apparently was much relieved. Flatus passed irregularly, as did small amounts of feces, and the abdominal condition was apparently relieved each time. The patient talked more or less and was generally improved until December 12, when his respirations became labored, and he sank rapidly, dying 51 hours after admission.

Inasmuch as the clinical picture was not typical, the autopsy was very interesting and showed the following: The right lung was distended, particularly the lower lobe, was reddish in color with gray mottling and the surface distinctly granular, shotty nodulation being palpable in the substance. All lobes were crepitant, and upon mobilization of the right apex it was seen to be lacerated and abscessed. On section through the upper lobe there were numerous lobulated abscess cavities, and the surrounding lung tissues showed smaller abscesses in the process of breaking down. Section through the lower lobe showed no cavitation but similar abscesses, and the bronchi stood out prominently, darkly pigmented.

The left lung was red in color, mottled gray. The upper lobe had no crepitation and the lower lobe practically none in its apex. Upon removal of the lung there was a large cavitation in the apex $5\frac{1}{2}$ centimeters in diameter and lacerated. Both lobes were distinctly granular on palpation, with few abscesses showing through the pleura. Upon sectioning the upper lobe contained practically no normal tissue and the bronchi and blood vessels were markedly dilated and thickened. The tissue surrounding the cavities was markedly necrotic and fibrotic, and section through the lower lobe revealed a cavity $11\frac{1}{2}$ centimeters in diameter with pigmentation and fibrosis of the bronchial tree and numerous gray abscesses undergoing varying degrees of degeneration.

The heart was normal except for a slight amount of sclerosis at the peripheral border of the mitral valve and a few atheromatous patches in the aorta.

The stomach was small, apparently free from contents, except gas, and was easily contained in the palm of the hand. In the left fossa the peritoneal fluid was blood tinged, and there was a definite con-

stricture of the descending colon just before it passed over the brim of the pelvis. Proximal and distal to this constriction the colon was markedly distended, and on pressure gas passed through the constriction. There was some kinking of the colon at this point, apparently due to distension and displacement. Upon removal of the section of colon showing this constriction there was no evidence of capillary hemorrhage in this area. The lumen was patent, and distention with kinking would account for partial obstruction, the actual constriction being only relative. Lying in the left iliac fossa were two loops of the ileum, about mid section, each approximately 8 inches long, which showed vascular congestion but no evidence of mesenteric thrombosis, the discoloration apparently being due to the blood-stained fluid lying in this fossa.

The liver surface was smooth, with a cyanotic discoloration particularly on the border of the under surface, and cut with some resistance. Cut surface was pale chocolate, lobules distinct. The gall bladder contained 10 c. c. of dark-colored bile, and mucosa showed typical strawberry cholecystitis. In the cystic duct midway between the sphincter and bifurcation there was a constriction of the duct, which failed to admit a small probe.

The splenic corpuscles were somewhat indistinct. The right kidney contained fairly large submucus hemorrhages, while in the left kidney there were similar hemorrhages but less pronounced. There was a small gray nodule, slightly elevated, which was not necrotic on section. The mucous membrane of the bladder was congested, as were the adrenals.

There were many symptoms of acute intestinal obstruction presented by this case, but, associated with the fact that we were dealing with a case of chronic pulmonary tuberculosis in which the symptoms of obstruction appeared while the patient was awaiting transfer to a hospital for treatment of his tuberculosis, the diagnosis and treatment were somewhat complicated. Severe pain was present, but there was no history of onset of local and, later, general abdominal distress. Distention and constipation were present, but the distention was markedly relieved by catheterization several times, the abdomen becoming much less rigid and the general condition of the patient subsequently improving. There was no history of vomiting nor did the patient vomit while in the hospital. Flatus was passed occasionally, as was a small amount of fecal material five or six days after onset. A leucocytosis of 27,500 was present and there was urinary retention. There was no apparent peristalsis and no palpable tumor mass.

Although we were dealing with an advanced case of pulmonary tuberculosis, these symptoms were overshadowed by the clinical picture of acute intestinal obstruction of an incomplete nature.

The sudden relapse and death of the patient following several periods of relief and apparent improvement brings up the question of the cause of death in such cases. As stated by McKenna (1), who quotes an extensive review by Ellis, "The literature contains an amazing number of conflicting reports pertaining to the fatal factor in acute intestinal obstruction." McKenna points out several salient features that would appear to corroborate the theory of a rapid absorption of a powerfully toxic intraenteric substance. This would account for the rapidly lowering blood pressure, the quickened thready pulse, the pinched face, and cold clammy skin.

Werelius (2), in his consideration of the relationship of death in high intestinal obstruction to liver insufficiency, draws his conclusions from experimental work on dogs. He states that death is due to interference with peristalsis, at the root of the whole situation being the mechanical obstruction itself interfering with peristalsis, which is absolutely essential to life. Possibly the greater the amount of nonperistaltic intestine the graver the danger. When the entire intestine is nonperistaltic, death is not far off. Even in the lowest obstruction, death is preceded by aperistalsis. He has found that the stoppage of bile is preceded by cessation of peristalsis by several hours and believes it very possible that the liver needs this peristalsis as a reflex stimulus for its continued activity. "Undoubtedly the entire gastrointestinal system, with the liver and pancreas, is entirely dependent on these muscular waves for continued functions." The danger of overdistention is a real one in that it causes paralysis of the peristaltic or active intestine proximal to the obstruction, thus rendering the entire intestine nonperistaltic. The Mayos, especially, recognized this, and in all cases in which the intestine had been subjected to marked surgical insult they averted the dangerous acute dilatation of the bowel by prophylactically instituting an outlet for the distending gases. Acute dilatation of the active peristaltic intestine proximal to the obstruction is the primary danger in acute obstruction of the intestine.

In this case, while the obstruction was only partial and was very low in the descending colon, it is probable that, although the actual constriction was relative, the kinking brought about distention and aperistalsis above. Several times relief was obtained by catheterization and passage of flatus during attempted colonic flushings, but in spite of apparent relief the normal physiology of the intestinal tract was interfered with to such an extent that in the presence of pulmonary tuberculosis of advanced type it was sufficient to produce death.

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**CAVERNOUS SINUS THROMBOSIS FOLLOWING SUBMUCOUS RESECTION—
CASE REPORT¹**

By J. L. EMENHISER, Lieutenant (Junior Grade), Medical Corps, United States Navy

Cavernous sinus thrombosis is a comparatively rare condition, occurring but 12 times in 50,000 cases from 1889 to 1919 in Johns Hopkins University clinic. Dwight and Germain reported 182 cases in the literature. It was first noted in an autopsy in 1821 by A. Duncan, clinically reported 18 years later by Vigla, and first clearly described by Knapp in 1868.

There are three separate and distinct types of the disease. The marasmic form is never primary, according to MacEwen, but occurs in connection with the same condition of the longitudinal or lateral sinus. Systemic debility is a predisposing factor. The traumatic form results from injury, such as may occur in operations upon the Gasserian ganglion, in the pituitary region, or upon the sphenoid sinus. The infective form, with which this paper mostly deals, is the most common. The infection may take place by direct extension from neighboring intracranial foci, as brain abscess, meningitis, sphenoiditis, or caries of the petrous portion of the temporal bone, or it may be blood borne through the venous channels, which communicate with the sinus directly or indirectly. To understand fully this latter mechanism and to appreciate the results of thrombosis, one must understand the anatomy of the parts. The cavernous sinus is paired, 2 centimeters in length, and traversed by numerous trabeculae. It extends from the sphenoidal fissure in front to the apex of the petrous portion of the temporal bone behind. Important structures, close by medially, are the internal carotid artery and abducens nerve; laterally are the oculomotor, the trochlear, ophthalmic and maxillary divisions of the trigeminal nerve. It communicates with the transverse sinus by means of the superior petrosal sinus, with the internal jugular by means of the inferior petrosal sinus, and with the one of the opposite side by means of the anterior and posterior intercavernous sinuses. The petrosals serve to empty the sinus and to drain partially the petrous portion of the temporal bone, the tympanum, the cochlea, the vestibule, and the inferior cerebellum. The principal source of blood supply is through the ophthal-

¹ From the United States naval hospital, New York.

mic veins. The areas involved are drained by the angular, the nasal, the anterior and posterior ethmoidals, the sphenoidal, the pterygoid plexus—through the foramen Vesalii, foramen ovale, and foramen lacerum—and the supraorbitals. Thus it is seen, infectious products may be carried to the cavernous sinus from the mouth, pharynx, neck, scalp, eyelids, orbit, nose, accessory nasal sinuses, face, mastoid, and ears, the last being the most frequent offender. Dorland Smith found, in 140 cases, the etiology to be as follows: Ears, 40 per cent; orbit and face, 35 per cent; mouth and throat, 13 per cent; nose, 9 per cent; other causes, 3 per cent. The causative organism found most frequently is the *Streptococcus hemolyticus* and more rarely, the *Streptococcus aureus* and the *Pneumococcus*. Most rarely, the *Diplococcus intracellularis* is found.

The symptoms are general and local. The former are those of sepsis; chills, fever, nausea, vomiting, mental disturbance, and coma. The latter are those of venous stasis and of involvement of nerves which pass through the sinus. Meningitic evidence may or may not be present. G. E. DeSchweinitz, writing in the Atlantic Medical Journal in June, 1924, says: "Early and prodromal symptoms may be headache, often severe, with or without fever, pain in and around eyes and in the teeth, diplopia and cold in head, increasing exophthalmus with edema of lids, face, root of the nose, and of the conjunctiva supervenes, first one side and soon (in over half of cases) on the opposite side, usually within 30 to 48 hours. Ptosis of paralytic origin is frequent, although it may be difficult to decide whether the drooping of the lid is due to third nerve palsy or to edema. According to muscles involved there may be divergent or convergent strabismus and finally complete fixity of eyeball, when all the nerves, third, fourth, and sixth, are implicated. There is some evidence available that early diplopia is due to paresis of the trochlear nerve. The pupils are soon dilated and fixed. Ophthalmoscopically, conspicuous signs are edema of retina and great distention and tortuosity of retinal veins. A true optic neuritis indicates orbital involvement but more often appearances are those of papilledema."

The diagnosis, when the condition is bilateral, is practically certain. In a small percentage of cases, however, the lesion is unilateral. Then it must be differentiated from orbital cellulitis, tenonitis, erysipelas of the eyelid with orbital involvement and thrombophlebitis of the orbital veins, and arteriovenous aneurism.

The prognosis in the infective variety is very grave. Dwight and Germain reported 14 spontaneous recoveries in 192 cases. Dr. Norton Wilson, of New York, has seen eight cases, only one of which lived over two weeks. Treatment so far is largely experimental. Autogenous vaccine, whole blood transfusions in 500 c. c. doses, and anti-streptococcic serum in 60 to 120 c. c. doses have been tried. No con-

clusions can be drawn as to their individual merits. Surgery was first resorted to in 1900 by E. W. Dwight. The patient lived but a few hours. Dorland Smith, after a careful review of the subject, thinks surgery is indicated, but most writers agree that results obtained do not justify the means.

Following is the report of a case which we had in this hospital:

J. C., a Veterans' Bureau patient, was admitted December 9, 1924, with the diagnosis of chronic tonsillitis and deviated nasal septum. He stated that for the past six years following his being gassed in service he had had frequent sore throat, accompanied by a hacking productive cough and nasal obstruction. History was irrelevant in other particulars.

An examination revealed tonsils small, deeply submerged, cryptic, and chronically diseased. There was a deviation of the nasal septum high up on the right with a low shelving ridge low down on the left. Physical examination was otherwise negative. Tonsillectomy was performed.

December 11, 1924. Convalescence was rapid and uneventful.

January 6, 1925. A submucous resection was done.

January 8, 1925. Patient has developed a hematoma between flaps of septum. Opened and drained. Temperature 101° F.

January 10, 1925. Hematoma still draining. Temperature normal.

January 11, 1925. Swelling in nose is subsiding. Free breathing through both nostrils. Condition satisfactory.

January 12, 1925. Patient had a chill this morning. Complaints of headache with pains in legs and arms. Temperature 104° F., pulse 120, respiration 25. Swelling in nose is subsiding. Sinuses are clinically negative. It is thought the patient has an attack of influenza. Treatment: Good elimination, aspirin grs. V, q. 3 h.; and forced fluids.

January 13, 1925. Fever continued, hanging around 103° F. Patient states he feels better and no longer has any pain, except an occasional headache. Aspirin is continued. Tongue is heavily coated, except at tip, where it has much the appearance of a strawberry tongue. There is no rash. A few scattered râles are heard throughout the chest. There is no cough.

January 14, 1925. Patient has a beginning iritis in right eye. Treatment instituted. Temperature dropped from 102° F. to 99.2° F. during the day, but in the evening again rose to 103° F. Examination, except for iritis and few scattered râles throughout chest, is negative. White blood count 11,400. Polymorphonuclear leucocytes, 83 per cent, lymphocytes, 15 per cent, large mononuclear leucocytes, 2 per cent.

January 15, 1925. Patient is toxic for first time. X ray of chest this date is negative. Twenty-five c.c. of 1 per cent gentian violet given intravenously.

January 16, 1925. Iritis is worse and patient has chemosis about left eye. Seen by eye specialist and treatment given. The patient's temperature is septic, and he is toxic, though he answers questions intelligently. Sinuses remain clinically negative. Blood culture incubated for 24 hours is negative. Another blood culture and a culture for typhoid taken this date.

January 17, 1925. Condition is same. Panophthalmitis present in right eye, which ruptured during the night. Patient's toxicity continues, though he is easily aroused and answers questions intelligently. There is no clinical evidence of meningitis. Swelling in the nose has practically subsided and patient has free breathing through both nostrils. As far as can be determined by bedside examination sinuses remain negative. Transillumination is negative. Scattered râles still present throughout chest. There is a soft cardiac murmur

at the apex, systolic in time and not transmitted. First sound is of rather poor quality with an irregular arrhythmia. First blood culture is negative after 48 hours. Second blood culture is negative after 24 hours. Twenty-five cubic centimeters of a 1 per cent solution of gentian violet given intravenously this date.

January 18, 1925. General condition is the same. Toxicity is extreme. Cardiac murmur is transmitted several inches to the left. There is chemosis around lower lid of left eye, but no infection present. The media is clear and pupils react well. Blood cultures remain negative. Right eye, this date, is still draining through perforation, which is at the corneal scleral junction above 5 o'clock. Tension of eye is increased. Local treatment is continued. White blood count, 11,020; polymorphonuclear leucocytes, 79 per cent; lymphocytes, 20 per cent; transillumination, 1 per cent.

January 19, 1925. General condition is same. Left eye is the same. Tension in right eye is less. There are no meningeal symptoms. This afternoon condition of right eye was worse. Pus was present in both chambers. Eye was incised under local anesthesia. A large amount of pus was evacuated and a drain inserted. A culture of pus was sent to the laboratory. Blood culture was positive this date for a slow growing, gram positive, short chained coccus.

January 21, 1915. Right eye is draining profusely. Conjunctiva of left eye is very chemotic. Culture from eye showed same organism that was found in the blood culture. General condition is the same. Temperature is septic. Twenty-five cubic centimeters of 1 per cent gentian violet was given intravenously this date.

January 22, 1925. There is no change in the patient's condition.

January 24, 1925. Patient is weaker and very toxic, but there is no evidence of meningitis.

January 25, 1925. Patient gradually became weaker and died at 5.25 p. m. this date.

Subsequent check-up showed infective organism to be a nonhemolytic streptococcus.

An autopsy was not obtainable. It is the opinion of Doctor Albright that the patient developed a metastatic panophthalmitis in the right eye, following a septicemia, secondary to some focus, probably the nose. A thrombosis of the cavernous sinus resulted. This view is substantiated by the fact that the symptoms in their order of appearance were those of sepsis, of iritis, of panophthalmitis, and then of sinus thrombosis. This indirect manner of development and the absence of meningeal symptoms are special points of interest in this case.

RECENT PROGRESS IN THE TREATMENT OF SYPHILIS¹

By B. C. SHEARER, Lieutenant (Junior Grade), Medical Corps, United States Navy

It is not the purpose of this paper to discuss the usual routine of treatment of early and late syphilis. The basic procedure used in the various clinics and by various physicians are all practically the same. It is true, of course, that there is some variation in the dosage

¹ From the United States naval hospital, New York.

and forms of the various remedies commonly used (arsenic, mercury, and iodides), and also the time intervals involved in the administration of these remedies are not always the same, but the fundamental principles of treatment do not greatly vary.

The question of arsphenamine *v.* neoarsphenamine is a problem which is not yet settled satisfactorily; and while most clinicians seem to believe that arsphenamine is a drug of choice, there are others who believe that neoarsphenamine is equally as efficacious a drug, and even the preferable one, in that larger doses of the neoarsphenamine may be given and at more frequent intervals than the arsphenamine. An interesting piece of work was reported by Strauss in the Journal of the American Medical Association in 1922. He and his coworkers chose 75 cases of syphilis and divided them in three groups of 25 each. While it is, of course, impossible to find any two cases of syphilis alike, the divisions were made in such a way that conditions would be fairly comparable. The physical make-up of patients, their age, weight, duration of the lesion, and intensity of the Wassermann reaction were all considered. Group 1 was treated with silver arsphenamine, group 2 with arsphenamine, and group 3 with neoarsphenamine. Throughout the series the dose of silver arsphenamine was 0.2 gram, of arsphenamine 0.4 gram, and of neoarsphenamine 0.6 gram. Eight intravenous injections of each of the three drugs were given to each of the patients in their respective groups. Wassermann tests were done before starting the treatment, after each injection, and seven days after the last injection. Of the 25 cases treated with silver arsphenamine, the Wassermann reaction became negative in 1 case; in the 25 cases treated with arsphenamine the Wassermann reaction became negative in 13 cases; and of the 25 cases treated with neoarsphenamine the reaction became negative in 9 cases. This apparent inferiority of silver arsphenamine is distinctly in opposition to the clinical experiences of such men as Parounigian, Kolle, Ritz, Galewsky, Hauck, and Fordyce, whose impressions are that all clinical stages of syphilis have responded to treatment of this drug with gratifying rapidity and thoroughness; that the response begins more promptly; and that the lesions involute more rapidly than is the case with a similar number of treatments with other arsenical preparations.

The reports concerning neo silver arsphenamine, which is being used by many German syphilologists, are similar to those reported for the silver arsphenamine.

There are several arsenic preparations which have been introduced as ideal substances for subcutaneous or intramuscular injections when arsphenamine or neoarsphenamine can not be given intravenously. The first of these preparations was sulpharsphe-

namine. The general opinion of the rather small number of observers who have reported on it seems to be that it is the least efficacious of the arsphenamine group of drugs. A number of other arsenic compounds followed this one, and have been rather extensively used by a few observers, who claim results equaling, and in some cases superior to, those obtained from neoarsphenamine and arsphenamine. Among these preparations are novarsenobenzol, reported by Minet and Legrand; sulfarsenol, reported by Jeanselme; amino-arseno-phenol, reported by Lepinay; oxyamino-phenyl arsenic acid, reported by Fournier. The work with these preparations is still in an embryonic stage and very experimental to say the least, as the number of cases reported did not exceed 35 except in one instance, that of the amino-arseno-phenol, in which Jeanselme reported on 150 cases.

The literature also contains reports of considerable recent work with mercurial therapy, most noteworthy of which are those reporting experiments with the intravenous injections of several of the mercury compounds. Howard reports the use of mercury cyanide in the treatment of secondary or latent syphilis and neurosyphilis. This salt contains a larger percentage of mercury than the other salts commonly used, is easily soluble in water, and in giving approximately 5,000 injections Howard has never observed any untoward reactions. The dosage used is 0.3 gram of mercury cyanide in 3 c. c. of normal salt solution. This is given three times a week for eight weeks, then neosolvarsan at the rate of two injections per week for four weeks. If the Wassermann reaction on the blood or spinal fluid remained positive, after a month's rest a second course was given, and if necessary a third. Of 40 cases of latent syphilis treated in this manner, the blood Wassermann became negative in 36 cases after the third course of treatment and remained so. In cases of neurosyphilis and paresis, serological cure was effected in only a small proportion of the cases.

Conrad and McCann report that out of 1,679 cases of syphilis treated at the Washington University Clinic with arsphenamine and intramuscular injections of mercuric chloride, 62 did not respond to this treatment, the Wassermann reaction remaining positive after from 1 to 13 courses of such treatment. These 62 patients were given intravenous injections of mercuric chloride, the dosage being started at 10 minims of 1 per cent solution and increased at the rate of 2 minims at each treatment until a dosage of 2 c. c. was reached. Two injections per week were given and a maximum dosage maintained unless symptoms of mercurial poisoning developed, in which case the dosage was reduced by one-half and then again gradually increased to maximum. The technique used by these investigators

varies from that of the others in that mercury albuminate was formed in the syringe before injection and without withdrawing the needle from the vein. Twenty such injections were given and then, at the end of a four weeks' rest, a Wassermann test was made. No other antisyphilitic remedy was employed during the entire period. They report that of the 62 patients treated by this method 40 patients, or 64 per cent of the cases, had negative Wassermans at the end of the treatment. The minimum number of injections rendering the reaction negative was 6, the maximum number being 22. In 14 of the remaining cases there was decrease in the Wassermann reaction in one or both antigens, and eight cases showed no change in Wassermann reaction, although several of them showed distinct clinical improvement.

Flumerin, which is the disodium salt of hydroxymercurifluorescein, has been shown by White and Ebersson to have some definite benefit in the treatment of syphilis. It is especially suitable for intravenous injections due to its low toxicity, absence of local irritating properties, seems to show no evidence of detrimental effect on the kidneys, and is yet therapeutically active against syphilitic infection.

Butler and Williams, working independently of each other, report very favorably on intravenous injection of mercurosal. Mercury salicylate has also been used intravenously by Butler with good results. Mercurosal, however, is the drug of choice in that the injections are painless, cause no disagreeable aftereffects, it provides accuracy of dosage, can be continued until the patient is sufficiently saturated, and, therapeutically, is quite as effective as any other mercury preparation.

During the past few years there have been many reports by many investigators on bismuth in the treatment of syphilis, and there are as many techniques and methods used as there are observers reporting their findings. No effort seems to have been made to follow any definite procedure until it has been given a fair trial. In fact, constantly increasing variations are being continually introduced. However, practically all reports given on bismuth therapy are favorable, and the studies of some of the leading syphilographers in this country and abroad indicate that bismuth has an established place in the therapy of the disease.

Perhaps a word should be mentioned concerning the vanadium salts, which were first studied by Fournier with experimental syphilis in rabbits. Later, Everson used subcutaneous and intramuscular injections of the sodium and potassium salts of tartrovanadate in 30 cases of primary and secondary syphilis and 3 cases of tertiary syphilis and reported very favorable results. However, the preparation in some instances was rather toxic to the patients, and sufficient

time has not elapsed to permit stating anything definite regarding the permanency of the improvements noted. Results indicate that vanadium is an active spirocheticide and that new compounds should be studied for which the ratio of the curative to the toxic dose is lower.

A great deal of interest has been recently aroused by the drug tryparsamid, which was first prepared by Jacobs and Heidelberger in 1915. This drug is the sodium salt of N-phenyl-glycine-amid-parsonic acid. Brown, Pearce, Keidel, Moore, Lorenz, Lovenhardt, Bleckwenn, and Hodges were amongst the first to study it in cases of human syphilis, and reported results in the treatment of neurosyphilis which were almost magic in nature. They found that the drug produced no local or general symptoms when given in 3-gram doses and that it possessed an affinity for the central nervous system. The beneficial results from treatment, however, was found not to be of a very permanent nature unless the administration of the drug was combined with intramuscular injections of mercury salts. In order to show the rather startling results, the following report is given: "Of a total of 64 cases of paresis treated by these authors, 28 have been discharged from the hospitals and are holding positions and earning a livelihood for themselves and their families for periods ranging from six months to two years. In nearly every case treated with mercury and tryparsamide the blood Wassermann was altered in the direction of negativity, in 32 cases the spinal fluid became completely negative, and in others there were spinal fluid changes in the direction of negativity."

Work of more recent investigators fails to corroborate these startling findings. The literature at the present time is almost flooded with reports on tryparsamide therapy, and conflicting results are being continually reported. There can be little doubt that the drug is of value in the treatment of syphilis of the central nervous system and that, no doubt, a great deal may be expected from it after a more perfect procedure and technique is perfected for its administration.

NURSE CORPS

HOW PSYCHOLOGY MAY HELP THE NURSE¹

By MARY CHADWICK

Florence Nightingale gave us the precept, "Nurse your patient and not the disease," and we are following out this advice when we begin to inquire into the psychological side of physical illness. Were the disease itself all we had to combat, the profession of the nurse would be far more simple than it is and, one must own, far less interesting. If the course of illness followed the lines laid down in the textbooks for nurses and there were never any unexpected complications or unlooked-for occurrences, we should become so bored that we would either give up nursing entirely or become machines. It is the patient, the differences to be observed in every case, whether nominally suffering from the same trouble or not, that makes our profession worth while, and it is our interest in these individual variations that leads us on or leaves us standing still.

During recent years this individual side of people has become the subject of careful study under the name of *psychology*; in America another name is also given to it, *behaviorism*, and it has been found that there are many patterns or types of persons who may usually be relied upon to act in a given way, according to their type, while others can not be ranged in any category and always behave in an unexpected manner. Yet another science, still more modern than the academic psychology, has arisen to give us more, deeper, and wider knowledge of ourselves and others, so that in the wake of knowledge may come understanding and, following understanding, help.

An Austrian nerve specialist, Sigismund Freud, discovered some 30 years ago now, that the most important part of ourselves, that which creates the dynamic force of the individual, is a part of us about which very little is known by ourselves or anyone else unless we have specially studied the subject, and to that part he gave the descriptive name of the *unconscious mind*. An American psychologist has compared this to an *iceberg*, one-tenth of which is above water and visible, while the remaining nine-tenths is out of sight under water. This is the difficulty we have to encounter in illness; it is always the unknown quantity that prevents the patients from getting on, this Unconscious Mind about which we know so little. Hitherto we have fought it blindly and instinctively, our Unconscious against theirs, and without definite knowledge, as our ancestors

¹ Reprinted from The British Journal of Nursing.

struggled against all disease and death, without the knowledge and scientific aids that are at our disposal to-day.

Now, to begin with, let us see what we may expect to find in this unknown tract, and I think, when I have explained it, you will agree with me that we find evidence every day in the manifestations of illness or its approach and encroachment into the personality of persons who generally contrive to drive it away and succeed in keeping it out of sight. The Unconscious Mind is a region where wishes, feelings, desires, and strivings go when they have been banished from the rest of the person's mind and thoughts in the course of his or her education or the culture of the race. During the whole course of our lives, as we have grown up from childhood, we have had to learn that it is not possible or desirable to *do*, to *have*, or to *be* all that we would like. We may successfully repress these wishes, or turn them into some other different and permitted channel which has the sanction of civilization, but, on the other hand, we may not. They may disappear from sight, go into hiding in our Unconscious, and from that shelter constantly strive to take us by surprise and win their own gratification. Perhaps in the first line should be placed, *having our own way*, the desire to do exactly as we like and give up to no one else; to have all the attention and to be the center of attraction, like an only child; to eat when and what we like, to sleep as we like; only to see the people that please us and to banish those who annoy. The Unconscious wishes are thoroughly egotistic. These wishes and many like them are to be gained by illness to a degree they can not be by health, and it is on this account that the following phenomena arise, which are often the subject of remark, that those folks who have the least attention when they are well become the most exacting when they are ill, or are most fastidious over their food, even though they may at the same time constantly apologize to the nurse for the trouble they are giving her; or the resentment shown by one patient in a ward when another more dangerously ill than herself comes in and proves a serious rival. To be the only or best beloved child is the aim of every sick person. *Child*, I use the word intentionally, for every illness is a *regression*, a retreat in face of overwhelming odds, to a position of safety, where the difficulty will be temporarily avoided; a running backward to a condition of irresponsible childhood, when everything was done for us, when we were washed, dressed, fed, attended to, and not very much expected of us—mother or nurse did everything and ourselves nothing.

But I should like to go into this question of *regression* a little more fully, because, as I said, when we understand this we understand so much more about the onset of illness. It is a recognized fact to-day that we are immune to illness from infection—that is to say, as long as our resistance is high. When this becomes enfeebled,

we fall a prey to the invading germ. As our resistance increases, we recover; should it decrease, we get worse and succumb. We well ask what governs this resistance. We find bacteriologists nodding their heads and talking wisely about white corpuscles or leucocytes, phagocytes, and all our faithful allies in this war against microbic infection, but they can not give us precise information as to what controls their origin or what sends them into the field in hundreds of thousands or millions; their habits are somewhat obscure and will finally be solved by the psychologist rather than the bacteriologist, I fancy. To gain a little light on the question, let us remember our war experience and those wards full of soldiers, so many of whom were wounded in much the same way. But, if we remember, no two followed the same course of healing, and not all responded to the same treatment. The tissues reacted in a different way, why, we do not know; perhaps some of us were curious, perhaps some of us were not. We said, maybe this man lost more blood than another, his vitality is low; but another with a splendid physique and comparatively small wound also failed to get on—why? Did we ever consider, then, this question of regression, and the opposite case, what may lie in front of a patient that he dare not get well and face. The difficulty was not always going back to the front; sometimes it was a sweetheart who had jilted a man who had lost a leg, or a wife who had been unfaithful in her husband's absence.

Let us take another instance, this time from the nursing staff, and not the patients in a hospital. If we could see beneath the surface and know the psychological state of every nurse or probationer who goes to the sick room with a septic throat or poisoned finger we should generally discover that it was really caused by some anxiety, worry, or misery, probably in the ward from which she had come, and that she was faced with a state of affairs which, or some person who, was more than she could stand and from which her psyche was forced to retreat, to regress to a condition where the demands were not so exacting and some of the comforts and consolations of childhood were to be gained by way of compensation.

Unconscious wishes are usually those of early childhood, and the secret of regression is once more to become a child and be able to gain them. Shock is also a form of regression, but one so rapid that the psyche is totally unable to keep pace with it. In its most serious forms it involves loss of consciousness from which the patient does not recover but passes on to the deepest state of regression—that is, death. The classical rules for treating profound shock are practically those which we would apply to the very feeble newly born.

In this state of regression, when we go back to our childhood and its desires, we find a tendency to put those persons in our immediate vicinity into the place of those with whom we used to be intimately

connected in our early years; doctor and nurse become, respectively, father and mother; similar behavior is expected from them and a corresponding attitude adopted toward them, the patient repeating his or her early reactions of love or hate, obedience or defiance where they are concerned. Neither should we lose sight of the fact that the nurse is also capable of making similar transferences, as they are called, because she is also equipped with an Unconscious as well as her patients, and it is quite capable of playing awkward tricks upon her when she least expects it.

These transferences are an important factor in the illness and recovery. In many cases, if overstrong and not properly understood and managed, they may prolong an illness, because the attention and sympathy of the nurse becomes indispensable, but it often serves as the towing line that finally brings the patient safely into the harbor of health. The patient who has no one upon whom to hold fast, who has no interest, and cares not whether he lives or dies, quickly slips through our fingers.

Convalescence, as we mentioned before, is the reverse process to falling ill. It represents a gradual growing up to a state of independence and once more facing the responsibilities and burdens of life. This factor accounts for the condition of relapse that is so often to be observed in the convalescent patient, or even the sudden death that occasionally intervenes before the patient is expected to be moved home for the end of convalescence.

What steps, we may ask, ought a nurse to take when this knowledge is at her command? The best advice to her is, "Keep the facts to yourself and act upon your knowledge; do not forget it for an instant." Nurses ought, of necessity, to be good actresses, for they constantly have much to hide from their patients. Everyone should be treated as though grown up, although one knows perfectly well they are feeling and behaving, although not in the least conscious of it, as if they were but a few years old. The reason why we so frequently find patients difficult or irritating is because we are expecting them to behave as though they were well. The sick person is bound to be irrational, and we should keep that in mind. It is not often that we can benefit a patient directly by passing on any of this information; the condition is so intimate that he or she would be blind to it, and so would only run away from it. It would be as useful as a perusal of the notes on the bed board. We know, and we can act upon our knowledge with understanding and sympathy; that is enough; but in addition we can use our knowledge to find out something about ourselves, but this is more difficult, although all the more valuable, because so many of our problems that we find in the attitude of our patients are but the reflection of difficulties in ourselves.

THE SOUL OF THE NURSE¹

Every administrator of experience has learned that, granted skillful craftsmanship, the most important qualities which his subordinates must have are those of the soul; qualities which enter into the formation of the ingrained personality; qualities which determine the success or failure of the individual and the organization to a greater extent than any other factor which is a part of collective effort.

In this connection the word soul is not used in a religious sense, but rather connotes those attributes which are the essence of character and hence the guiding force in the affairs of life. They are not peculiar to any profession or occupation, but they are particularly essential to the nurse who, in her contact with the mentally and physical ill, is called upon to exhibit the highest quality of character.

Unfortunately nurses in their training (and this applies equally to most of the professions) are not given an analysis of those traits of character which may be their protection or undoing in their life's work, and when they are brought face to face with them realize but dimly their importance. Like many other qualifications, they are partially innate; always they are capable of cultivation; with care they may be developed and rounded out until the noblest of women is produced—the ideal nurse. Crystallized, these essentials reduce themselves to three, with several subdivisions. They are common sense, earnestness, and honor.

Common sense includes those good, sound, ordinary intuitions which are supposedly common to all mankind. It is the congener of judgment, that operation of the mind involving comparison and discrimination and by which knowledge of values and relations is formulated. Common sense and judgment have as their background knowledge, and always the common-sense thing to do is the right thing to do. All common sense is based on charity and justice administered with that keenness of perception, discernment, deduction, and discrimination known as acumen.

Allied to it is simplicity, the antithesis of affectation. Simplicity connotes a sense of humor, that rare virtue which is the antidote for dry egotism and which permits a dissociated view of self-absurdities. The great forces and the great people of this world are simple. It is only the weak, the inefficient, and the lazy who are obliged to resort to the protective mimicry of conceit and artificiality.

Part and parcel with simplicity is self-control, the secret force which controls others. Power of will and power of self-restraint require strength of feelings and strength of self-command; they are

¹ Reprinted from *The Modern Hospital*, February, 1925.

the corner stone of strong character. An ungovernable temper is the symptom of defective mental poise, an impotence of coordinated effort. Those who shout, nag, taunt, or are vindictive can not inspire confidence in their associates. The higher the vocal note, the lower is the effect produced. Sarcasm indicates inadequacy of self-control and is a weapon which wounds those who use it. Tact, the oil which lubricates the bearings of human intercourse, is, on the contrary, an efficient instrumentality in accomplishment.

Earnestness is sincerity of effort. Without it there can be no real success. Energy, enthusiasm, and perseverance are its handmaidens, and assiduity, the ability for hard work, application, and diligence its result. Possession of these qualities forbids defeat. They are qualities which have won the day at many a bedside. Inspired by faith—faith in the cause, in oneself, in mankind, and in a divine Providence—they move mountains. True faith breeds true optimism, the quality of seeing only the best in men and situations, a heartener when reverses come, a shining beacon marking the course to achievement. Faith, though, can not stand alone; it must be supported by courage. But courage as a quality must be continuous. It does not imply fearlessness; on the contrary, it knows fear and conquers it, and when this virtue is strong in withstanding adversity it becomes fortitude, an ability to labor on against threatening defeat and to overcome the forces of disease and death. Earnestness is the parent of steadfastness and poise, and from these issue dignity, that virtue of calmness and equanimity of mind and action which is an inspiration to the sick.

Essential as is common sense and absolutely necessary as is earnestness, they are valueless without honor, the inherent virtue of every normal, unvitiated mind. Its corner stone is truthfulness. In the nurse's, more than in any other profession, accuracy of mind and tongue is a vital necessity, because on it may depend human lives or happiness. Courage enters into its formula because of the readiness with which moral cowardice prompts deviation from the line of exact truth. Honor is an unselfish virtue; it places the task ahead of the worker and when necessary sacrifices the latter to the former. It is a sheet anchor in temptation, a guide in conduct, and an inspiration to the highest and best. It shines brightly in defeat and is modest in success.

These are the blocks which fitted together make the mosaic of the nurse's soul. It is no wonder, then, that the nursing profession is honored of all men; that they who coax the tired spirit back into the weary body are the emblem of all that is noblest, most selfless, and sublime.

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For review.

INTRODUCTION TO DERMATOLOGY, by *Sir Norman Walker*. Eighth edition. William Wood & Co., New York, 1925.

The fact that this book is in its eighth edition testifies to its deserved popularity.

As its author states, it is an introduction to dermatology and does not profess to be a complete system. In it are described fully and completely all the more common diseases with which the ordinary practitioner is likely to meet and, less completely, the rare ones. The text is clear and concise and leaves no doubt as to the author's opinions.

Special attention should be called to the chapter on dermatitis. This chapter contains many newly discovered facts, particularly in relation to causation and treatment of this most baffling condition.

This edition has many full-page illustrations, which are a great help in visualizing the conditions described.

Taken as a whole, the book is to be recommended. It should prove especially valuable to medical officers of the Government services, where a quick and clear reference to skin conditions is often essential.

RHEUMATIC HEART DISEASE, by *Carey F. Coombs, M. D., F. R. C. P.*, London, Wm. Wood & Company, New York, 1925.

A very thorough, complete, and excellent work on rheumatic heart disease wherein the author refutes all attacks against the condition as an entity; advances arguments for it, well supported by extensive clinical and pathological material culled from the clinics at Bristol mainly; and a book filled with numerous photomicrograms and electrocardiograms. The author has treated the condition with the thoroughness which its gravity required and has further emphasized the necessity of early diagnosis, especially in childhood, where so much unwitting damage is done by oversight, cursory attention, and lack of knowledge.

The question of etiology is completely discussed, force being brought to bear on the streptodiplococcus, the relation of simple endocarditis to malignant endocarditis, the secondary factors and the necessary steps to eradicate same, and the Aschoff bodies.

Each step of the diagnosis is lengthily explained and sustained by proofs as they appeared to the author in his experiences at Bristol, while the concluding chapters on treatment and prevention contain valuable information. The chapters on morbid physiology, anatomy, and histology are complete and extremely enlightening.

PSEUDO-APPENDICITIS, by *Thierry de Martel, Chirurgien des Hôpitaux de Paris, and Edward Antoine, Médecin des Hôpitaux de Paris*. Authorized translation by *J. A. Evans, A. B., M. D., formerly Assistant Radiologist, Hôpital St. Antoine, Paris*. F. A. Davis Company, Philadelphia, 1925.

An excellent translation of a carefully compiled and well-illustrated volume dealing with one of the most difficult and most important problems of medicine and surgery—When is “chronic appendicitis” really a disease of the appendix and when is this symptom complex due to some other cause?

The authors show that patients suffering from conditions that simulate chronic disease of the appendix may really be the victims of lesions of the cecum or colon or of the tissues in the region of the cecum, and that these patients too often undergo appendectomy with no relief from their symptoms. Pericolitis, omentitis, Lane’s kink, and mobile cecum are especially incriminated. As the authors state, “The treatment of pseudoappendicitis depends directly on the diagnosis made, but it is indispensable to weigh with the greatest of precision the arguments in favor of medical or surgical treatment.”

If this book were to be studied and its lessons well learned by all those who attempt to perform appendectomies “because they are so simple,” there would be fewer unfortunates who submit to operation but who afterwards still suffer from the symptoms to relieve which the operation was performed.

THE EFFECTS OF INANITION AND MALNUTRITION UPON GROWTH AND STRUCTURE, by *C. M. Jackson, M. S., M. D., LL. D., Professor and Director of the Department of Anatomy, University of Minnesota*. P. Blackiston’s Son & Co., Philadelphia, 1925.

This highly scientific treatise gives the results of long-continued research by the author and his fellow workers, as well as a review of the literature on inanition and malnutrition. It is of especial interest to scientists working in pathology, biochemistry, zoology, physiology, etc., but is also of value to the clinician in that it explains the causes of many of the conditions with which he meets in practice.

The early chapters of the book discuss the effects of inanition upon plants, protozoa, and the higher invertebrates.

Part II deals with the effects of inanition on the vertebrates, including man, and goes into great detail in discussing these effects upon the various organs of the body, as well as upon the body as a whole.

In Part III conclusions are drawn, many of the effects of inanition are shown in tabular form, and a bibliography of more than 100 pages is given.

INTERNATIONAL CLINICS. Edited by *Henry W. Cattell, A. M., M. D.*, Philadelphia, U. S. A. Volume 1, thirty-fifth series, 1925. The J. B. Lippincott Company, Philadelphia.

Under the able editorial guidance of Dr. Henry W. Cattell, this number of International Clinics maintains the high standard of practical value to which he has brought the periodical. There are 20 articles on a wide variety of subjects. The excellent summary of the progress of medicine in 1924, by Doctor Cattell and Major Coupal, has 77 pages of the newest ideas, materials, and methods.

THE EXAMINATION OF WATERS AND WATER SUPPLIES, by *John C. Thresh, D. Sc., M. D., D. P. H.*, and *John F. Beale, B. A., M. R. C. S., L. R. C. P., D. P. H.* Third edition, P. Blakiston's Son & Co., Philadelphia, 1925.

This volume will be in keeping with its predecessors in the thoroughness with which the subject is treated.

It is written entirely from the standpoint of the water and water supplies of the British Isles. Owing to the geologic formation, geographic position, density of population, etc., the water met with and the problems presented are in general quite different from those in the United States, and the book naturally contains much that can not be generally applied here.

The utilization of electric conductivity and hydrogen-ion concentration methods in the examination of water appears to be a good step forward, since these can supply information that is not otherwise available.

The methods used in the analysis and examination in many cases differ quite materially from those of the American Public Health Association, which are accepted as standard in this country, and as a consequence can not be wholly accepted.

While the book is admirably written and contains much valuable material, it should not be considered as a standard for the solution of American problems—problems which, as a whole, are quite different from those of the British Isles. It should, however, be available to all concerned with the questions of water and water supply.

PATHOLOGY AND BACTERIOLOGY OF THE EYE, by *E. Treacher Collins, F. R. C. S., Consulting Surgeon of the Royal London Ophthalmic Hospital and Consulting Surgeon to Charing Cross Hospital, etc.*, and *M. Stephen Mayou, F. R. C. S., Surgeon of the Central London Ophthalmic Hospital, etc.* Second edition. P. Blakiston Son and Company, Philadelphia, 1925.

In the new edition of this work the authors have thoroughly revised the former edition and added considerable new material, bringing it up to date. The same method of classifying diseases of the eye on a physiological rather than an anatomical basis has been re-

tained, making it very easy to use as a reference book. The chapters on "Disturbance of the circulation and constitution of the nutrient fluids of the eye," on "Inflammation," and on "Degeneration," have been rewritten and include the latest development in the studies of glaucoma, hypotony, and the inflammatory conditions.

This is an excellent reference book, brought up to date, and it would be a help to the naval surgeon doing eye work.

A DICTIONARY OF TREATMENT, including Medical and Surgical Therapeutics, by Sir William Whitla, M. D., D. Sc., LL. D., M. P., *Emeritus Professor of Materia Medica and Therapeutics in Queen's University, Belfast; Honorary Physician in Ordinary to H. M. the King in Ireland, etc.* Seventh edition (Thirty-eighth thousand). Paul B. Hoeber (Inc.), New York, 1924.

Any book which survives to the seventh edition must have practical value. To determine if the rule held true in this case, the reviewer kept the book on his desk for two weeks and referred to it whenever a question of treatment arose, which it did several times daily.

The result of this test was that the book earned a permanent place as a quick reference book. It has over a thousand pages of practical suggestions, clearly and briefly written and arranged in alphabetical order. Both medical and surgical fields are covered. The book is highly recommended.

RECOVERY RECORD, FOR USE IN TUBERCULOSIS, by G. B. Webb, M. D., *Consulting Physician, Cragmor, Glockner, and Sunnyrest Sanitoria, etc.*, and C. T. Ryder, M. D., *Cragmor and Glockner Sanitoria.* Second edition. Paul B. Hoeber (Inc.), New York, 1925.

Almost one-half of this book consists of charts on which the person recovering from tuberculosis may keep a record of his temperature, pulse, and weight, together with such additional data as may seem of sufficient interest to warrant his consulting his physician. The remainder of the book gives simple rules for hygienic living, looking to the protection of the patient as well as of others, and explains in nontechnical terms the various disturbing symptoms that may arise during recovery. While written in an optimistic vein, no attempt is made to minimize the gravity of certain signs and symptoms, and the convalescent is advised to consult his physician at frequent intervals.

The person recovering from tuberculosis will make a speedier and more comfortable recovery if he will read and follow the instructions laid down in this book.

MEDICAL AND SURGICAL REPORT OF THE ROOSEVELT HOSPITAL, New York. Second series, 1925, based on the work of the years 1915-1924, inclusive. Paul B. Hoeber (Inc.), New York City, 1925.

Contains 34 articles by various members of the hospital staff. Several are here published for the first time; others have appeared in various periodicals. They cover a wide field and evidently have been carefully selected.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

A STUDY OF PROBABLE FOOD REQUIREMENTS OF NAVAL AVIATION PERSONNEL UNDERTAKING EXPLORATION OF THE AREA ABOUT THE NORTH POLE

By J. R. PHELPS, Lieutenant Commander, Medical Corps, United States Navy

Early in May, Lieut. Commander Richard E. Byrd, United States Navy, who is to have command of a Navy unit consisting of three airplanes with the MacMillan expedition this summer, consulted the writer about food requirements and foods possibly suitable for the purposes in mind.

The plan is to proceed with two vessels fitted out for the expedition to Etah, which is about 713 miles from the North Pole. From there it is expected the three airplanes, loaded to capacity with excess fuel and other necessary supplies, will proceed to a favorable location a little more than 300 miles from the ships and establish an advanced base. Depositing their extra supplies, they will return for more. Possibly a third trip will be made in order to accumulate a sufficient stock of foods, fuel, and lubricating oil at the advanced base to enable them to carry on a thorough and deliberate exploration of the area about the North Pole.

A kerosene stove and the necessary fuel will be taken to the advanced base, so that some cooking can be done. It will be apparent, therefore, that the problem of provisioning is different in many respects from the food problems of previous expeditions into Arctic regions.

If no unexpected difficulties arise, the members of the unit may reasonably expect to be provided with food that is satisfying and agreeable to them. Part of the time at least they should have cooked foods served hot, although much of the food must necessarily consist of articles which can be eaten while in flight without cooking. It is also necessary to keep in mind the possibility of an accident which will force some or all members of the party to depend entirely upon such food as can be carried with them on a long and slow return on foot to the advanced base, in case one or two airplanes are disabled and they can not be picked up by the third. The inten-

tion is to keep one or another of the planes in reserve at the advanced base while the others are exploring.

Besides providing for such emergencies, it was necessary to plan a ration that would provide, as well as all the involved conditions and circumstances would permit, against the contingency that something may happen before the work is completed toward the end of the summer, so that the party will be unable to return to Etah. Sufficient food of high fuel value must be taken to keep seven men alive through several months of extremely cold weather in case it becomes necessary to build an igloo of snow and spend the winter in a region devoid of vegetation and animal life.

Lieut. Commander Byrd stated that weight was of paramount importance. Comparatively speaking, it appeared that the lifting capacity of the aircraft was to be borne in mind more than space. The ration proposed has been accepted by the aviation unit of the expedition, and the foods will be taken as specified and listed by weight. While it is not possible to judge in advance how well all needs which may arise will be met, the matter of planning may be of some interest at this time. Criticisms based on actual experience after the expedition has returned should prove very valuable in planning rations for similar expeditions in the future. The employment of heavier-than-air machines, which can cover a greater distance in a few hours than can be traversed in three weeks by a sledge expedition, of course justifies some modification of methods of rationing that have developed from the experience of surface expeditions. At the same time, the possibility that such machines will have to be abandoned can not be ignored. Lieut. Commander Byrd will familiarize himself with the various points of scientific interest connected with nutrient and fuel needs of the body under the conditions experienced, and his conclusions should make possible some discussion of rather more practical value than can be drawn from study of the opinions of earlier explorers, who described the foods used and depended upon by them in such terms as to make it impossible to estimate utilizable fuel values with any degree of accuracy.

The following letter to Lieut. Commander Byrd was intended to give him such information about nutrient and fuel needs as he might require. The various points which were considered in planning the proposed ration and the conclusions reached are discussed in the letter and require no further mention here.

UNITED STATES NAVAL MEDICAL SCHOOL,
Washington, D. C., May 21, 1925.

DEAR MR. BYRD: Following our conference, I am, in accordance with your request, putting in writing the points covered in relation to the feeding of your men while on your adventurous attempt to explore the area about the North Pole.

Total fuel value of the ration

The first proposition to be mentioned is that man is essentially a heat engine. He will only run so many hours, days, or months, as the case may be, doing a given amount of work, on a given amount of fuel. He must maintain his body temperature at approximately 98° F. on this fuel. Other things being equal, he will require more fuel for a given output of energy when the atmospheric temperature is low.

I am, of course, unable to estimate the minimum amount of food per man per day that will be required, because I can not estimate the probable outputs of energy or the climatic conditions to which you will be subjected. But 3,000 calories per day is ordinarily sufficient for men of average size doing moderately hard work. On the other hand, we hear that lumberjacks in the northern woods consume 6,000 and sometimes as much as 7,000 calories per man per day. It is not clear that they actually need that much, but appetites stimulated by hard work and cold weather lead them to consume that much food. Nature appears to have provided for the combustion of excessive food under some conditions, at least, so that increase in weight does not always follow.

Fuel value of food is measured by an appropriate heat unit just as the fuel value of coal is measured by the British thermal unit. The unit in the case of food is the large calorie—that is, the quantity of heat required to raise the temperature of 1 liter of water 1° C.

In view of the probable climatic conditions to be encountered and your estimate of the amount of physical work to be performed, I suggest that you plan for upward of 5,000 calories per man per day. The remainder of this discussion will be based on the assumption that you will do this.

Chemical composition of foods

The fuel constituents of the food are:

- (a) Proteins.
- (b) Fats.
- (c) Carbohydrates.

Proteins.—Of the three constituents, proteins alone contain nitrogen. Proteins furnish the material for the repair and building up of the body tissues. Proteins are essentially compounds of amino acids, of which there are many. Some 17 or 18 of the amino acids are essential to body maintenance and repair. In general, the more of these 17 or 18 essential amino acids a given protein contains the higher its biological value is said to be, provided other points about the article of food containing it are favorable to its use.

If 10 per cent of the total calories in your ration (5,000 calories per man per day) are protein calories, that would make 125 grams of protein. That will be amply sufficient to meet your needs. However, an excess of protein can also be combusted as fuel in the body like fats and carbohydrates, even if not as efficiently. Therefore, in constructing your ration we need not worry about an exact percentage. It will be all right if protein calories represent between 10 and 15 per cent of total calories.

One gram of protein yields 4 calories (utilizable energy—average).

Fats.—Each gram of pure fat will yield on the average 9 calories. These calories serve like the carbohydrate calories for the liberation of energy for the performance of muscular work and production of heat.

A fair balance ordinarily would be 25 to 35 per cent of total calories furnished as fat calories.

In the climate into which you are going fats will be combusted readily, so there is no particular need to keep the fat calories below 35 per cent of the total, and in view of the information recorded by those who have experienced conditions in the Arctic regions it appears that 50 per cent of total calories may well be furnished by fats. Moreover, you will for several other reasons furnish enough carbohydrates to assist in the utilization of fats. It has aptly been said that fats are consumed in the body in the fires lighted by the carbohydrates. Fats are hydrocarbons.

Carbohydrates.—These include the sugars and starches. Each gram of carbohydrate supplies on the average 4 calories. These calories, like those furnished in fat, are available for the performance of muscular work and production of heat.

Carbohydrate calories in your ration will make up the difference between 100 per cent and the protein plus the fat calories.

Essential mineral constituents and vitamins

In recommending the list of foods discussed below I am, of course, mindful of the importance of providing a diet which will not permit any member of your party to suffer from scurvy or any other form of dietary deficiency, no matter how prolonged the entire dependence upon the foods you take with you.

Foods to be considered

Flour.—Experience acquired by those going into the northern country, prospecting or exploring, seems to indicate the wisdom of including flour in the restricted list of food. This presupposes that you will be able to cook to a limited degree at the advanced base you spoke of, even if not at points between there and the pole. You should be able to make flapjacks, as well as use flour with pemmican and hot water flavored with tomato paste to make a thick, palatable, and very nourishing soup. I suggest that you learn the sour-dough method of making bread or muffins used by mushers in Alaska.

Whole-wheat flour is to be preferred to the demineralized and devitaminized white flour. However, it may not be as palatable to some in the party. You might compromise and secure a special flour that is reasonably white while retaining some of the antineuritic vitamin and some of the valuable mineral constituents. However, you can make out with white flour because I would not for a moment suggest a list of foods whereby you would have to rely entirely upon any one article for any one essential constituent. Therefore, I am inclined to recommend self-rising pancake flour.

If you do not see your way clear to taking flour as flour, you may take an additional quantity of crackers or hard bread. I submit, however, that it is important to avoid the monotony of diet that would result thereby if you can avoid doing so. Weight and not bulk is the primary consideration. Just so many calories in dried food (that is, minus the water content) are going to weigh just so many pounds. It will be necessary in any event to carry a considerable proportion of your flour in the form of pilot bread or hardtack—especially for rationing the planes for dashes from the advanced base.

Fuel value of flour and crackers

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Fuel value per pound (calories)
Wheat flour, average-----	13. 8	7. 9	1. 4	76. 4	0. 5	1, 625
Wheat flour, self-rising, average-	10. 8	10. 2	1. 2	73. 0	4. 8	1, 600
Whole-wheat flour, average-----	11. 4	13. 8	1. 9	71. 9	1. 0	1, 675
Boston crackers, average-----	7. 5	11. 0	8. 5	71. 1	1. 9	1, 885
Flat bread-----	9. 8	14. 9	. 5	73. 6	1. 2	1, 665
Pilot bread-----	8. 7	11. 1	5. 0	74. 2	1. 0	1, 800

Thus, wheat may be made to furnish part of the protein and part of the carbohydrate components, but very little fat.

The protein, fat, and carbohydrate values for all foods considered in this paper are those given in Bulletin No. 28, revised edition of the tables showing the chemical composition of American materials, by Atwater and Bryant, published by the United States Department of Agriculture.

Butter

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
Butter as purchased-----	11. 0	1. 0	85. 0	0	3. 0	3, 605

It would seem wise to provide a considerable proportion of the fat calories in the form of butter. The fuel value is high per pound. It is a customary food, palatable and dependable, an important source of fat-soluble vitamin, and it should keep well in the cold climate in light tin containers. It is ready to eat and furnish heat and energy to the human machine without cooking, but may be used in a considerable variety of ways even with your limited facilities for cooking.

The weight can be reduced a trifle by taking canned butter fat, which contains only 1 per cent of water by weight instead of 11 or 12 per cent in butter. However, that is not a big item, because only 7 pounds of butter are recommended for 7 men for 10 days. Ordinary butter will have a better flavor than the dehydrated butter.

Bacon

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
Bacon, smoked, medium fat, as purchased, average-----	17. 4	9. 1	62. 2	0	4. 1	2, 795

The only contraindication to including bacon is the relatively high water content, 17.4 per cent, and refuse, 7.7 per cent. I think you will make a mistake if you make concentration of food material the sole consideration in choosing your dietary. You have got to consider that the human machine must be taken care of as well as the engines of the aircraft. You can not

fly unless you take enough fuel and lubricating oil for the latter. Make an extra trip from the ship to the advanced base if necessary to provide for yourselves. The value of the bacon rests not alone in its high fat content but as well in its 9 per cent of protein of good biological value and satisfying to the appetite with its agreeable flavor. I believe when the ordeal is over you will be thankful for the forethought that prevents deadly monotony.

Powdered milk.—There is satisfactory evidence concerning the keeping qualities of the powdered milk manufactured by the Merrell-Soule Co., of Syracuse, N. Y., and it would appear advisable to take that product instead of canned condensed milk previously considered. It appears to have been established that even the antiscorvy vitamin is retained in the dried milk recommended. The average fuel values are as follows:

Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
1. 5	26. 74	28. 0	38. 0	5. 76	2, 319. 76

Powdered milk will prove useful for several purposes. It will serve perfectly well in coffee, on oatmeal, as a constituent of soup, in gruel, etc. There is no question about its sustaining qualities. As a demonstration, Doctor Bundesen, health officer of Chicago, ran a locomotive for several miles on powdered milk as a fuel instead of coal. You will find it useful in running the human engine.

Navy beans, dried.—It would seem desirable to include a moderate weight of dried beans to help break the monotony of diet, provided you can carry a pan or other suitable utensil to pan or boil them. The fuel value is moderately high for the weight, and the ash, 3.5 per cent, will help to overcome the deficiency in minerals that is characteristic of some of the other foods in this list.

The chemical composition is as follows:

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
Navy beans, dried, average--	12. 6	22. 5	1. 8	59. 6	3. 5	1, 605

Oatmeal.—This will also serve in a moderate proportion of the total weight of the ration to give variety as well as furnish considerable amounts of proteins, starch, and minerals. The total fuel value per pound also justifies including it in the ration, providing it is not distasteful to any member of the party. It can be served boiled with milk powder and sugar. It goes well with bacon. It can be made into cakes and fried with bacon fat so that every last bit of the latter can be used to advantage. It can be used for gruel.

Chemical composition of oatmeal

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
Oatmeal, average-----	7. 3	16. 1	7. 2	67. 5	1. 9	1, 860

American cheese.—The fuel value merits consideration. It is a staple with some sheep tenders in Europe. By some, any great proportion in the diet might be regarded as objectionable in view of its tendency to cause constipation. That is true of any concentrated food, and concentrated foods are all that you can take with you. The cheese consists principally of the proteins and fat from cows' milk. You will have them in the milk powder, but the flavoring of cheese will add another flavor to help break the monotony.

Chemical composition

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
American cheese, pale as purchased.....	31. 6	28. 8	35. 9	0. 3	3. 4	2, 055
Full cream cheese.....	34. 2	25. 9	33. 7	2. 4	3. 8	1, 950

Chocolate.—It is well to include a limited amount of chocolate, because it is valuable for its flavor, and the utilizable fuel value per pound is also high.

Chemical composition

	Per cent water	Per cent protein	Per cent fat	Per cent carbohydrate	Per cent ash	Calories per pound
Chocolate as purchased, average.....	5. 9	12. 9	48. 7	30. 3	2. 2	2, 860

Pemmican.—Experience seems to dictate that pemmican should form a large part of your ration. It is said to be easily masticated, and the raisin content is said to promote the flow of saliva. However, it does not contain all essential vitamins and minerals, and it does not furnish enough carbohydrate to balance the diet properly.

Thompson in his book, "Practical Dietetics," refers to the experience of several Arctic expeditions with pemmican, although the chemical composition of the pemmican used is not given. He states, "While performing active service in the cold a diet of 1.5 pounds of stewed deer's meat did not prevent hunger, but 1.5 pounds of pemmican per day with 0.5 ounce of tea and 0.5 ounce of Liebig's extract of meat supported life for some time.

On their long sledge expedition, De Long allowed each man 1 pound of pemmican per day; meat, 2 ounces; bread, about 8 ounces; Liebig's extract, 1 ounce; sugar, 2 ounces; lime juice, 1 ounce; coffee, 2 ounces; tea, 1 ounce.

While still in the ship, locked in the ice, the average allowance of food per day was about 4 pounds, but some complained of being hungry on this ration. In the Jeannette expedition, 1879-1881, the average quantity of food allowed per man per day was about 5.5 pounds. Meat was fed three times a day. Fat was supplied in the form of pork and butter. Bread and potatoes made the bulk of starchy food and constituted about two-thirds of the whole amount of food, according to Thompson. The diet at first included large amounts of vitamin-containing foods and other relished articles (although vitamins were not thought of)—milk, butter, eggs, oatmeal, cheese, macaroni, canned fruits and vegetables, and dried fruits, including apples, peaches, dates, figs, prunes, and raisins.

Quoting from Greely's account, "Three Years of Arctic Service," he gives the amount of food per man per day eaten during the two years at Fort Conger as over 4 pounds. Thompson stated that 4.5 pounds, including coffee, tea, chocolate, and condiments, may reasonably be assumed as the quantity of food necessary for maintenance where the actual temperature is 4° F.

In 1883, the experience of 40 days in the field in a mean temperature of 17.8° C. below zero led to the following modified ration, although the men had returned in health and strength the previous year:

	Ounces		Ounces
Meat.....	22	Tea or chocolate.....	0.25
Butter.....	2	Salt.....	.25
Vegetables.....	4	Pepper.....	.05
Bread.....	10		
Sugar.....	2		¹ 40.5
Milk.....	.5		

Greely wrote that three-fourths of the ration were about equal quantities of pemmican, bacon, and frozen musk-ox meat, and the balance was made up of canned sausages and corned beef in about equal quantities.

From the percentages of the components of the pemmican which you furnished me relative to the product you expect to use, we have calculated the chemical composition as shown in the following table:

	Grams of article	Grams H ₂ O	Grams protein	Grams fat	Grams carbohydrate	Grams ash
Dried beef.....	53.0	21.20	20.74	4.49	0.28	6.29
Oleo oil.....	31.5			31.50		
Raisins.....	9.5	1.39	.25	.31	7.23	.32
Sugar.....	6.0				6.00	
Total.....	100.0	22.59	20.99	36.30	13.51	6.61
Grams per pound.....			95.34	164.8	61.3	
Calories per pound.....			381.36	1,483.2	245.2	

Total calories, 2,109.76 per pound.

The utilizable fuel value appears to be 2,109.76 calories per pound. In making these calculations it was assumed that the water content of the dried-beef component was 40 per cent, making the water content of the pemmican as a whole 22.6 per cent. That would seem to be a safely conservative assumption to make. It may be in reality that the moisture content is a little greater or a little less. That would not make any great difference in the fuel value, for we calculated the value on the assumption that the dried beef contained only 20 per cent of moisture and found that the food value on that basis would be only 2,300 calories to the pound.

It seems reasonable to include pemmican in the ration to the extent of 1 pound per man per day, thus furnishing about 2,100 calories. That is almost as much as certain previous expeditions have had to depend upon almost exclusively. This provision will give you a considerable range, since at the advanced base, with facilities for cooking, you will not have to consume up to the full daily allowance of pemmican. Moreover, in favorable weather the members of your party will not require an average of 5,000 calories per man per day. This question, of course, resolves itself into the general question of how

¹ About 2.5 pounds.

wisely you are going to balance the need for taking enough food to provide against unexpected prolongation of your stay away from food supplies against the limited carrying capacity of your airplanes. In other words, if you plan for 10 days rations and then have to make the food last 15 days the daily consumption must be less. The estimate of 5,384 calories provides for hard work in low temperatures. Here we have two variables. If the work is not so hard or if the temperature is not so low, the consumption may be less. The duration of stay is a third variable which you yourself must plan to meet. A fourth variable is the question of waste or loss by spoilage or accident. Below is shown what I regard as a reasonably well balanced ration composed of the articles herein discussed, on the basis of feeding 7 men for 10 days, setting forth the weight of each article in pounds and tenths of pounds required for the party for 10 days. If you ration for 30 days, you can multiply the weight of each article by 3; if for 60 days, by 6; and so on.

Sugar.—This is 100 per cent concentrated carbohydrate. Each gram furnishes 4 calories. The need, as well as the desirability, of carrying a proper amount of sugar as sugar is obvious.

Pemmican is deficient in carbohydrates and must be supplemented with sugar or starch to obtain a fair balance. From the standpoint of balance, judging from ordinary dietary needs, pemmican is somewhat overweighted with protein, and the fat content is very high. Of the total calories furnished, 70 per cent are fat calories and 18 per cent are protein calories. Only 11.6 per cent of the calories are supplied by carbohydrates. There would seem to be a deficiency in the latter. But experience must be taken into consideration. If pemmican has been found suitable, and if it relieves hunger and sustains great muscular effort in extremely cold weather, there is probably good reason for the high fat content and moderately high protein content. For this reason I would not undertake to reduce the percentage of fat calories in your complete ration to much less than 50 per cent. On the other hand, it would seem permissible to reduce the fat to approximately that proportion, because, supplemented as it is in the proposed ration with a sufficient quantity of sugar and some starch, it should prove even more satisfactory as fuel than the higher proportion in pemmican alone.

Whether that assumption is true or not, it is desirable that the ration contain reasonable amounts of sugar and starch, for the probabilities are that you will perform only moderately hard work much of the time in only moderately cold weather.

If the unexpected happens, you will have the additional fat in the pemmican to fall back on. As a matter of fact, it is not practicable to construct the ration exclusive of the pemmican to have less than about 40 per cent of total calories represented by fat. If the ration is to be properly balanced, there must be no deficiency of fat-soluble vitamin. While this principle can be secured by taking a teaspoonful of cod-liver oil two or three times a week, it is preferable to include sufficient butterfat to furnish enough of this vitamin to balance the whole ration, including the pemmican. A moderate amount of butterfat in the milk powder and as butter, with bacon is sufficient quantity to be used to good advantage, brings the percentage up rather higher than in an ordinary diet when fresh vegetables and other bulky foods are to be had. But, as suggested above, that is probably desirable.

It is possible that an excess of fat tends to a certain extent to make up for the deficiency in cellulose (roughage) in overcoming the tendency to constipation caused by the concentrated foods necessarily depended upon in such expeditions. Admiral Peary stated that while the stools were small when

subsisting wholly or almost entirely upon pemmican, the men were not constipated.

Tomato paste.—Published reports of a reliable character seem to indicate that the high content of antiscorvy vitamin (vitamin C) of the tomato will be retained for the duration of your stay in the Arctic regions in the concentrated tomato paste manufactured by the Tomato Products Co., Paoli, Ind. It may be that other manufacturers put up a paste that is just as suitable, but the time at my disposal was too limited to permit investigation of more than one recommended and apparently vouched for article.

Similar remarks apply to the products of Merrell-Soule Co., Vitamin Food Co. (Inc.), and E. L. Patch Co. Competition should be waived on these articles, because it is very important to have guarantees on the vitamin contents. Satisfactory guarantees might be obtained for other products, but I can recommend only those I have considered.

The tomato paste can be used to good advantage in making a simple tomato soup with water and milk powder thickened with flour. The mixture should not be boiled in order to avoid unnecessary destruction of vitamin, as well as deleterious effect upon the milk powder in solution. It should be possible to make a rich soup with pemmican flavored with the tomato paste. The paste, unheated, can be used with bacon sandwiches and cheese sandwiches.

Desiccated orange and lemon.—Powdered orange and powdered lemon manufactured by the Merrell-Soule Co., Syracuse, N. Y., are recommended. We have reasonable guarantee that these products will retain their vitamin properties in a practically unimpaired state for a year or more.

It would not be wise to depend upon tomato paste and powdered milk for protection against scurvy. The orange and lemon will afford that protection, as well as furnish additional flavors to overcome monotony of diet.

You might prefer in place of powdered orange juice the concentrated orange juice put up by the Exchange Orange Products Co., of San Dimas, Calif., controlled and operated by the California Fruit Growers Exchange, "Sun-kist" group. This is a heavy thick liquid, rapidly concentrated in vacuum at a low temperature, about 6 to 1. The vitamin C content is preserved. The flavor when converted back into orange juice may be preferable to that of the powder.

Neither product would be deadweight, as either one will serve in the ration to supply carbohydrate calories in concentrated form as well as vitamin.

Vegex.—This is an extract made from brewers' yeast by the Vitamin Food Co. (Inc.), 1819 Broadway, New York, N. Y. It is the same as the British preparation, "Marmite," which proved satisfactory to supplement emergency rations in the British Army during the World War, as recorded in the British Official History of the War. As stated on page 84, Volume II, of that work, the product is almost indistinguishable in appearance, smell, and flavor from extract of meat.

Vegex is included in the proposed ration to furnish water-soluble B vitamin as protection against neuritis. It is a reddish-orange-colored powder. Dissolved in warm water it tastes not unlike consommé soup. It can also be used with seven to eight parts of butter or cheese in sandwiches.

Tea and coffee.—These represent deadweight so far as calories are concerned, but it appears that they should be included in reasonable amounts nevertheless. They will serve as vehicles for the ingestion of sugar and milk. The tea can be compressed if necessary, but in view of the fact that weight is of more consequence in the airplanes than bulk, compression may not be necessary.

Condiments.—I recommend:

Salt.....	1 pound for 7 men for 10 days.
Pepper.....	1 ounce for 7 men for 10 days.
Celery salt.....	8 ounces for the expedition.
Onion salt.....	8 ounces for the expedition.
Cloves, powdered.....	2 ounces for the expedition.

Cod-liver oil.—It might be well in order to be further protected against dietary troubles to take along 1 gallon of cod-liver oil. I recommended the oil put up by the E. L. Patch Co., of Boston, Mass.

The proposed ration and its caloric value

	Weight (pounds), 7 men, 10 days	Calories protein	Calories fat	Calories carbohydrate	Total calories
Flour.....	10. 0	1, 852. 3	490. 3	13, 256. 8	15, 599. 4
Pilot bread.....	28. 0	5, 644. 1	5, 720. 4	37, 729. 2	49, 093. 7
Bacon, medium fat.....	8. 5	1, 528. 2	23, 408. 7	-----	24, 936. 9
Whole milk powder (Merrell-Soule Co.)..	20. 0	9, 712. 0	22, 881. 6	13, 801. 6	46, 395. 2
Navy beans.....	3. 5	1, 430. 1	257. 4	3, 788. 2	5, 475. 7
Cracked wheat or oat- meal.....	3. 5	1, 023. 3	1, 029. 7	4, 290. 3	6, 343. 3
Chocolate.....	3. 5	819. 6	6, 964. 6	1, 925. 8	9, 710. 0
American full-cream cheese.....	3. 5	1, 646. 2	4, 819. 4	152. 6	6, 618. 2
Pemmican.....	70. 0	26, 695. 2	103, 824. 0	17, 164. 0	147, 683. 2
Paoli tomato paste.....	2. 25	224. 7	230. 0	980. 6	1, 435. 3
Orange and lemon (Merrell-Soule Co.) (powdered orange, 4 pounds; powdered lemon, 2 pounds)....	6. 0	166. 7	115. 2	10, 329. 4	10, 611. 3
Vegex (Vitamin Food Co.).....	3. 0	1, 353. 5	-----	-----	1, 353. 5
Butter, tinned.....	7. 0	127. 1	24, 311. 7	-----	24, 438. 8
Sugar.....	15. 0	-----	-----	27, 240. 0	27, 240. 0
Tea.....	2. 0	-----	-----	-----	-----
Coffee.....	5. 0	-----	-----	-----	-----
Total.....		52, 223. 0	194, 053. 0	130, 658. 5	376, 934. 5
Per cent.....		13. 85	51. 48	34. 66	-----
Calories per man per day.....					5, 384. 78

SUMMARY

The ration including pemmican

Protein calories	Fat calories	Carbohydrate calories	Total calories per man per day
<i>Per cent</i> 13. 85	<i>Per cent</i> 51. 48	<i>Per cent</i> 34. 66	5, 384. 78

Weight= $\frac{211 \text{ pounds}}{70}$ =3.01 pounds per man per day.

Protein=186.51 grams per man per day.

The ration without pemmican

Protein calories	Fat calories	Carbohydrate calories	Total calories
25, 527. 8 <i>Per cent</i> 11. 14	90, 229. 0 <i>Per cent</i> 39. 36	113, 494. 5 <i>Per cent</i> 49. 50	229, 251. 3 -----

Calories per man per day, 3,275.02.

Weight=2.01 pounds per man per day.

Protein=91.17 grams per man per day.

Pemmican 1 pound per man per day

Protein calories	Fat calories	Carbohydrate calories	Total calories
381. 36 <i>Per cent</i> 18. 08	1, 483. 20 <i>Per cent</i> 70. 30	245. 20 <i>Per cent</i> 11. 62	2, 109. 76 -----

Protein=95.3 grams per man per day.

Conclusion.—Some one else might have approached this problem in a somewhat different manner. Different articles of food might have been recommended. But the assumed variables with which we must deal necessarily limit selection to a few outstanding foods. The caloric value per pound must be high and the foods chosen must be acceptable to those who will eat them. It is necessary to assume that little or no cooking may be possible and that you may have to fall back on high protein and high fat concentration in case of accident involving a stay through one winter. At the same time provision should be made to furnish a list of foods that will permit a reasonably varied diet consisting of cooked food served hot in case everything goes well.

It should be borne in mind that the weight of each article given in the table above is calculated for seven men for 10 days. In transporting supplies to your advanced base for 60 days, 90 days, or longer period you must remember that the diet will not be balanced if you depart from the 10-day schedule. You should insist upon using up the least-desired foods along with those which prove most agreeable in the proportions in which they are provided for a 10-day period. For example, you must carry a good deal of pemmican, and you must consume it from today. Of course, I do not know that pemmican will not be preferred to some of the other articles.

In calculating the ration I have consulted a number of men whose work and studies have made their suggestions very helpful regarding one point or another which had to be considered in this connection. Acquaintance with Surgeon Joseph Goldberger, United States Public Health Service, and proximity of the United States Naval Medical School to the United States Hygienic Laboratory made it possible informally to discuss with him several questions regarding which his experimental studies in dietary deficiency diseases made comment and suggestions by him very desirable. Others who made helpful suggestions were:

Dr. M. X. Sullivan, United States Hygienic Laboratory.

Dr. W. D. Bigelow, Director, National Canners' Association Research Laboratory.

Dr. E. F. Kohman, National Canners' Association Research Laboratory.
Lieut. Commander G. F. Clark, Medical Corps, United States Navy.
Chief Pharmacist E. R. Noyes, United States Navy, United States Naval Medical School.

Chief Pharmacist M. W. Throckmorton, United States Navy, Commissary Officer, United States Naval Hospital, Washington, D. C.

Dr. R. S. Fleming, Chief Chemist, Merrell-Soule Co., Syracuse, N. Y.

Dr. A. D. Holmes, E. L. Patch Co., Boston, Mass.

Mr. C. P. Wilson, Director, Research Bureau, California Fruit Growers' Exchange, San Dimas, Calif.

Finally, mention should be made of the assistance given by Chief Pharmacist's Mate W. A. Washburn, United States Navy, in my office in connection with voluminous arithmetical calculations, of which the brief table presented above gives but little indication.

Very truly yours,

J. R. PHELPS,

Lieutenant Commander, M. C., U. S. Navy,

In Charge, Division of Preventive Medicine.

Lieut. Commander R. E. BYRD, U. S. Navy,

Bureau of Aeronautics,

Navy Department, Washington, D. C.

OUTBREAK OF FOOD POISONING CAUSED BY SMOKED TONGUE CONTAMINATED WITH A BACILLUS OF THE MEAT-POISONING GROUP

By A. J. TOULON, Lieutenant Commander, Medical Corps, United States Navy

An outbreak of food poisoning affecting 278 men occurred at the United States Submarine Base, Coco Solo, Canal Zone, April 4, 1925. The epidemiological report submitted by the Senior Medical Officer of the station is as follows:

During the afternoon of April 4, 1925, 278 men of the crews attached to the United States Submarine Base, U. S. S. *Fulton*, U. S. S. *S 42*, and Naval Air Station reported to the dispensary, exhibiting symptoms what appeared to be acute food poisoning, probably produced by the Gaertner group of bacilli. The symptoms in most cases were nausea, vomiting, purging, severe abdominal cramps, and general muscular cramps, and, in some cases, these were followed by circulatory collapse.

Owing to the limited space available at the dispensary, most of the cases were treated in the open space to the rear of the dispensary building. All cases were immediately given a dose of magnesium sulphate and, if vomiting was not induced, were given ipecac. Quite a number of men failed to respond to this treatment and were given hypodermic injections of apomorphine. Once emesis was started, copious and repeated drafts of sodium bicarbonate water were forced on the men to cleanse the stomach thoroughly. This was followed by hot black coffee to prevent collapse. Some of the more severe cases exhibited hematemesis and passed visible blood in the stools.

Before nightfall all cases were moved to barracks No. 1, which was converted into a temporary hospital. During the night a medical officer, hospital corpsman, and assistants detailed by the executive officer were constantly on watch. Administration of soda water and coffee was continued as needed, and, in a number of cases of circulatory collapse, morphine, strychnine, and adrenalin were used. By about 10 p. m., most of the men were sufficiently recovered to permit sleep, and the following morning all but 30 men were returned to their various units.

Immediately after it became known that the condition was more or less general, a special patrol was despatched to Colon to collect all men on liberty. In Colon it was found that practically every one of the regular patrol had been affected and had been sent by the patrol officer to the Canal Zone Hospital in Colon, where eventually 16 cases were treated. All of these 16 men were returned to the base the following morning.

When the first cases began to appear at the dispensary, orders were immediately sent to the galley to discontinue any further issue of any articles of food served at the noon meal, and in addition a cross section of the ration was sent to the dispensary for analysis.

All men concerned with the issue, handling, cooking, and serving of the meal were questioned as to the appearance of the food, the mode of handling, the manner and length of time cooked, and as to whether any of these men had been affected by diarrhea or other gastrointestinal disturbance during the past two months.

While the patients were undergoing treatment, they were closely interrogated as to which articles of the ration they had eaten, the time element involved from the time of eating, the onset of symptoms, and the nature of the symptoms. The noon meal consisted of smoked tongue, boiled potatoes, cabbage, some spinach, pickles, lemonade, and apricot pie. By a process of elimination suspected articles of food narrowed down to the smoked tongue.

A curious phase of this epidemic was that no member of the chief petty officers' mess, numbering about 65, was affected, although they ate practically the same food. Upon investigation it developed that the chief petty officers' cook had recooked the tongue before serving it to that mess. This would rather indicate recent contamination and destruction of the microorganisms by re cooking before any considerable amount of toxin had formed.

Samples of the suspected food and a specimen of feces from one of the patients were sent to the Ancon Hospital for analysis, and a report by the doctor in charge of the laboratory showed a "gram negative bacillus intermediate to the typhoid bacillus and *B. coli* group," evidently conforming to the Gaertner or meat-poisoning group.

With the exception of several rather severe cases which showed signs of prostration and circulatory collapse, the majority of the men were returned to duty after observation for one day, and in no case did the disability last over four days. Two or three patients who returned on the following day had mild recurrences of symptoms and were treated subsequently, but there were no fatalities and apparently no permanent disabilities from the condition.

The detailed clinical description of cases as required by Bureau of Medicine and Surgery questionnaire covering food poisoning is as follows:

- (a) Cramps were first indication of illness.
- (b) The onset was sudden.
- (c) No previous symptoms.
- (d) Could not have been a relapse or recurrence of any disorder.
- (e) Most cases were ill about 5 or 10 minutes before seeing medical officer.
- (f) Appearance of prostration and pain.
- (g) There was continuous pain.
- (h) There was vomiting for a short period.
- (i) There was purging, tenesmus, bloody stool.
- (j) There was colic for a short period.
- (k) There was a chill.
- (l) There was slight fever.
- (m) There was severe frontal headache.
- (n) There was general cramping of muscles of trunk and extremities.
- (o) There was sudden and in some cases marked prostration.
- (p) No history as to condition of mouth.
- (q) No ocular symptoms.
- (r) There was cyanosis.
- (s) The pulse in cases recorded was slow and feeble.
- (t) The rate of respiration was not recorded. The character was irregular.
- (u) There was no skin eruption.

The first patient reported for treatment about 1 hour and 45 minutes after eating the suspected food and the last about 6 hours and 30 minutes after eating.

From an exhaustive investigation held by order of the Commanding Officer, the following facts were established:

- (a) About 250 men were taken sick Saturday, April 4, 1925, between 1 and 6 p. m., due to food poisoning.
- (b) A sample of tongue served at the noon meal April 4, 1925, was submitted for laboratory examination at the Ancon Hospital and was found to be infected with an organism of the intermediate or meat-poisoning group.

(c) The stool of one of the men affected on this date was also cultured and found to contain the same organism.

(d) All men taken sick had eaten tongue, and some men who ate nothing but the tongue were affected.

(e) Of 582 men partaking of the meal, about 250 were affected.

(f) The cook who boiled the tongue on April 3 ate a portion of the meat immediately after cooking and was not affected.

(g) The chief petty officers' cook recooked the tongue the morning of April 4 after it had been skinned because he was not satisfied with the cleanliness of the tubs in which the tongue was placed previous to slicing. No one who ate the tongue in the chief petty officers' mess was affected.

(h) Meat can be infected prior to slaughter in the living animal.

(i) Meat can be infected after slaughter by handling or by vermin.

(j) Meat infected by this particular group of organisms shows no change in its gross appearance, and contamination can only be determined by laboratory tests.

(k) The tongue served at the noon meal on April 4 was ordered February 26, 1925, from the officer in charge, Naval Supply Depot, South Brooklyn, N. Y., and arrived on the U. S. S. *Cristobal*, March 12, 1925, on invoice No. 436616, dated February 27, 1925, which called for 354 pounds of tongue in wooden boxes. The tongue was inspected by the inspector of the Bureau of Animal Industry at the time of delivery. It was received frozen and was kept frozen until issued to the Commissary Officer of the Submarine Base, Friday, April 3, 1925.

(l) Between the time of original issued to the Commissary Officer and the time the meat was served to the mess 24 hours had elapsed. During this time the meat was boiled for five hours, skinned, and returned to the chill room. It was sliced between 6.30 and 8 a. m., April 4, and was then placed in the warming pans until served to the mess about 11.20 a. m. During this time the tongue was handled by different persons and exposed.

(m) There is not sufficient personal supervision by the Commissary Officer in regard to preparation of food and personal cleanliness of the galley personnel.

(n) The presence of flies, roaches, and ants was noted by the board.

(o) Data were not available as to the maximum and minimum temperatures of the chill room, although a thermometer was available for this purpose.

The conclusions reached were that these men had been poisoned by tongue served in the general mess which had become infected, probably by human carriers or vermin, during a rather long period of preparation for serving, and that incubation of the bacteria with

resulting formation of toxin had been favored by ideal conditions—i. e., a warm, moist temperature in the galley.

In closing this report it is particularly gratifying to invite attention to the splendid cooperation exhibited by all hands. This was true particularly in the cases of hospital corpsmen, who, themselves suffering from the effects of this poisoning, continued to assist others until forced by physical exhaustion to give up.

REPORT OF AN OUTBREAK OF INFLUENZA ON BOARD THE U. S. S. WEST VIRGINIA IN APRIL, 1925

By Commander H. A. MAY, Medical Corps, United States Navy

An epidemic of influenza began April 17, 1925, during the recent voyage from San Francisco to Honolulu, Hawaii.

Ordinary catarrhal fever, or severe "cold", has been common all winter, and when, on the 17th of April, four cases of that disease applied for treatment no special attention was paid to the fact. On the 18th, five more cases came to sick call, and seven more on the 19th. It was then recognized that an epidemic had begun, and though the symptoms were very mild, really causing little discomfort after the first 12 hours, the diagnosis was changed to influenza, principally because of the rapid spread. Below is shown the daily number of admissions:

April 15	1	April 24	18
April 16	0	April 25	9
April 17	4	April 26	4
April 18	5	April 27	2
April 19	7	April 28	1
April 20	6	April 29	5
April 21	9		
April 22	37	Total	125
April 23	17		

This number includes those cases at first diagnosed as catarrhal fever. No complications were noted in any case, and the average number of sick days for individual cases was 3.86.

Where the infection originated I have been unable to determine. Several days prior to sailing, large drafts of men from three training stations came to the ship for further distribution, about 100 of them remaining on board when we left San Francisco. Incidence of the disease among these 100 was approximately 15 per cent, while among the balance of the crew it was 7.5 per cent. This is doubtless due to nonacclimation of the recruits. Again, the disease may have been picked up by men on liberty in San Francisco. At any rate, conditions on board ship were prime for rapid spread of the infection when implanted. The ship was overcrowded with men and officers; the sea was rough, and air ports could not be kept open; the air out-

side was chilly, and the men remained inside rather than on the weather decks. Liberty in San Francisco had been plentiful, and resistance of individuals was doubtless lowered through late hours and more or less indiscretion in diet and possibly drink.

When the sick-bay bunks had been filled, 17 cots were placed in the anchor-engine room on the third deck, under the sick bay; when these were full, compartment A-510, starboard, outside the sick bay, was vacated by the crew billeted there, and sick men swung there in hammocks or were bunked on cots.

No special sanitary measures were instituted to check spread of the disease other than a very rigid enforcement of provisions already embraced in the ship's organization book. A leaflet was printed for distribution among the crew, suggesting how they might aid in efforts at elimination. The response was prompt and wholehearted.

A QUESTION RELATIVE TO COWPOX VIRUS AND METHOD OF VACCINATING

A few days ago the medical officer of a naval station in the United States forwarded to the Bureau of Medicine and Surgery a package of recently manufactured cowpox virus, requesting information as to the probable danger of using that particular lot.

He stated that of about 240 vaccinations, presumably with virus bearing that lot number, a surprisingly low percentage of failures had resulted—less than 10 per cent. The method of vaccinating was reported as follows: "Sterilization of part with alcohol, scarification of site of inoculation, and the application of a protective thin pad of sterile gauze." His doubt as to the advisability of continuing to use the virus in question was expressed in the following sentence: "In many instances, in adults as well as in children, reactions have been severe, with marked constitutional symptoms, chill, fever, general malaise, marked cellulitis of the tissue about the site of vaccination, lymphadenitis, and in two cases, cellulitis in the interior aspect of the arm directly opposite the site of inoculation."

There was no reason to suspect that there was anything wrong with the virus. But it may be said that the principal manufacturers of cowpox virus have recently been marketing virus of higher potency than in previous years. The importance of distributing only virus of high potency and of educating physicians, druggists, and even health officials so that the virus will be handled and preserved in such a manner as to insure that it will not lose its potency is obvious. Otherwise it is probable that a considerable percentage of persons who submit to vaccination will not receive the protection against smallpox which they and doubtless often their physicians

believe they are getting. Increase in the immunity of population groups in the United States is not likely to be brought about through the use of relatively impotent virus in the presence of smallpox of the virulent type experienced in several States this year to the degree that will result in prompt control of the infection and prevent many unnecessary deaths from smallpox next year.

The medical officer was informed that the symptoms he described, except cellulitis, are to be expected in susceptible persons. It is not clear that he was really describing anything more than a marked areola except in two cases where secondary infection possibly occurred.

As for the technique, scarification is likely to facilitate invasion by other microorganisms. We have tried repeatedly, through the pages of the *BULLETIN*, to discourage scarifiers. The United States Public Health Service is trying to induce physicians to give up the method of scarification, and the State of New York has recently by act of the legislature made it illegal to scarify in that State—that is, the law provides that vaccination shall be performed only by physicians licensed under the laws of the State and only in such manner as shall be prescribed by the State Commissioner of Health. It is understood that scarification will be disapproved by regulation. There are one or two other interesting points about the new law. No vaccine virus may be used unless it is accompanied by a certificate of approval by the State Commissioner of Health, and approved virus must be used only within the period of time specified in such approval. Every vaccination must be reported to the local health officer within 10 days on a form provided by the State Health Department, giving the name of the maker of the virus and its lot and batch number as well as the evidence relating to the result of vaccination. It is understood that the criteria of successful vaccination will be similar to those accepted in the Navy as relating to the primary take, accelerated or modified reaction, and the immediate reaction indicative of immunity.

There is reason to believe that introduction of the virus very superficially into the skin by multiple punctures with the point of the needle gives results superior to other methods. With the slight degree of traumatism and the small area in which the virus is inserted, not over one-eighth inch in diameter, the liability of accidental and secondary infection is reduced to a minimum. At the same time there is even greater chance that a primary take will result in the case of a susceptible person vaccinated by this method. Perhaps it would be more apt to describe the method as prickling with the point of the needle, rather than puncturing. If the needle is held flat against the tightly-drawn skin and pressed horizontally

against the skin the point can hardly fail to penetrate far enough to insert the virus to the proper depth, and enough will be inserted to give an entirely satisfactory take by repeating this simple procedure 30 or 40 times in the same area limited to not more than one-eighth inch in diameter. If preferred, while the needle is being pressed against the skin, thus forming a little roll over the point, the point can be carried forward a little, making a more definite but still superficial puncture. This may be done four or five times. The needle should not draw blood. Excellent takes result from three to five such pricklings.

A single short, one-eighth to one-quarter inch, superficial scratch is advocated by some. This method is not open to any particular objection, except that immunity reactions may not be so easily read as after insertion by multiple punctures.

During the recent vaccination campaign in Washington, D. C., it seemed that bad arms were much more frequently seen among persons inoculated by scarification than among those vaccinated by gentler methods. This may have been due in part to the fact that physicians who scarified were more likely than others to advise covering the site of inoculation with a celluloid shield or some other device.

With an approved method of vaccinating, no form of dressing is required for a few days at least, and it is better simply to keep the arm bare for a few minutes until the inoculated area is dry, when the sleeve can be drawn down without fear of infection. In primary-take cases and with persons having marked accelerated reactions with vesicle formation, protection by means of sterile dry gauze may be indicated after the lesion has developed and until a dry scab has formed. This is especially the case where the vesicle has been torn or broken so that its contents continue to ooze out. As a rule it is better in such instances to do without the gauze if the individual is situated so that the lesion can be exposed to the air for several hours and thus be permitted to dry thoroughly. The disadvantage of the gauze covering is that it sticks to the vesicle or pustule and oozing begins afresh each time the dressing is changed.

The statement of the medical officer, referred to above, that he has recently had a surprisingly low percentage of failures—less than 10 per cent—is in itself surprising, because at the same time he presented evidence that the virus he was using was potent. With a potent virus 10 per cent of failures would be very high. It is possible that he has failed to note or has failed to appreciate the significance of immunity reactions. And if he has, that is very surprising, for the subject has been covered so many times in the

pages of this BULLETIN that all medical officers may be expected to have a thorough understanding of all points involved. He was informed that there appears to be no reason why he should not continue to use the virus he has in stock, with approved technique.

**STANDARD FORM FOR REQUESTING PATHOLOGICAL EXAMINATION OF
TISSUES AT THE UNITED STATES NAVAL MEDICAL SCHOOL**

To assist medical officers by making it unnecessary for them to write letters when tissues are forwarded to the United States Naval Medical School for examination, and at the same time to insure that all necessary information regarding the case is submitted along with the specimen, the following form has been adopted. Copies can be secured by writing to the school. The form is ready for distribution in pads of 100 copies each.

The completed form is filed for future reference, together with the histopathological findings in every case. It is therefore important that no item of the required information be omitted.

REQUEST FOR PATHOLOGICAL EXAMINATION

From: _____
_____ Date _____

To: Naval Medical School, Department of Pathology, Washington, D. C.

1. It is requested that a histopathological examination be made of the following specimen of tissue forwarded in 10% formalin solution.

Antemortem _____ Postmortem _____

CLINICAL HISTORY

Name _____ Age _____

Race _____ Sex _____ Occupation _____

Location of lesion _____

Duration _____

Gross appearance _____

Blood findings:

W. B. C. _____ R. B. C. _____ Hg% _____

Differential _____

Wassermann reaction _____

Remarks: _____

Clinical diagnosis _____

Signature _____

48258-25-7

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by boards of review at naval training stations:

All naval training stations

	Number	Per cent of recruits received	Per cent of recruits reviewed
<i>Cumulative data for Jan. 1 to Apr. 30, 1925</i>			
Recruits received during the months.....	3,169		
Recruits appearing before board of review.....	143	4.51	
Recruits recommended for inaptitude discharge.....	121	3.82	84.62
<i>Data for the month of April, 1925</i>			
United States naval training station, Hampton Roads, Va.:			
Recruits received during the month.....	55		
Recruits appearing before board of review.....	1	1.82	
Recruits recommended for inaptitude discharge.....	1	1.82	100.00
United States naval training station, Great Lakes, Ill.:			
Recruits received during the month.....	61		
Recruits appearing before board of review.....	3	4.92	
Recruits recommended for inaptitude discharge.....	3	4.92	100.00
United States naval training station, San Diego, Calif.:			
Recruits received during the month.....	167		
Recruits appearing before board of review.....	1	.60	
Recruits recommended for inaptitude discharge.....	1	.60	100.00
United States naval training station, Newport, R. I.:			
Recruits received during the month.....	68		
Recruits appearing before board of review.....	1	1.47	
Recruits recommended for inaptitude discharge.....	1	1.47	100.00

ADMISSIONS FOR INJURIES AND POISONING, FEBRUARY, 1925

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during February, 1925, is based upon reports reaching the bureau prior to May 10, 1925:

	Admissions February, 1925	Admission rate per 100,000 per annum February, 1925	Admission rate per 100,000 year, 1924
<i>Injuries</i>			
Connected with work or drill.....	314	3,191	3,148
Occurring within command but not associated with work.....	167	1,697	1,705
Incurred on leave or liberty, or while absent without leave.....	85	864	1,004
All injuries.....	566	5,752	5,857
<i>Poisoning</i>			
Industrial poisoning.....	1	10	21
Occurring within command but not connected with work.....	38	386	128
Associated with leave, liberty, or absence without leave.....	2	20	25
Poisoning, all forms.....	41	417	175
Total, injuries and poisoning.....	607	6,169	6,032

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	February, 1925	Year, 1924	February, 1925	Year, 1924	February, 1925	Year, 1924
Per cent of all injuries.....	55.5	53.7	29.5	29.1	15.0	17.2
Per cent of poisonings.....	2.4	12.1	92.7	73.4	4.9	14.5
Per cent of total admissions, injury, and poisoning titles.....	51.9	52.5	33.8	30.4	14.3	17.1

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases selected from morbidity reports for the month of February, 1925, are worthy of notice from the standpoint of accident prevention:

Machinery hazard.—While cleaning a drill in a drill press, the guard gave way and a finger was caught between the gears. The accident, which was ascribed to negligence on the part of other persons, was responsible for 29 sick days.

Defective chain hoist.—The chain of a hand hoist parted and permitted a 12-inch shell to fall against a man's thigh, causing a contusion. The accident was reported as due to negligence on the part of other persons.

Exploding water gauges.—Two water-gauge accidents were reported during the month. Each was attributed to lack of a safety device. One resulted in a lacerated wound of the cheek and the other a lacerated wound of the neck requiring retention on the sick list for eight days.

Unguarded emery wheel.—An emery wheel used without a guard injured the finger of a man grinding a valve.

Steam line hazard.—While a man was working on a high-pressure drain valve in a bilge compartment, another man pulled off the cap of a check valve. Before the man in the bilges could get out he sustained burns of the arm, face, and thigh which required treatment for 16 days on the sick list.

Steam line hazard.—A man leaned against an exposed steam pipe leading to a deck winch. A burn of the hand requiring treatment on the sick list for four days resulted.

Defect in temporary rigging.—While a screen for motion pictures was being erected, a defective line parted, causing a man to fall

about 20 feet to the deck. A fracture of the forearm resulted and caused 39 sick days.

Capstan and line hazard.—While a submarine was being secured, a man caught his foot in a loop of line and sustained a contusion of the leg, requiring treatment on the sick list for 17 days.

Winch and line hazard.—A winch line carried away while stores were being handled; a portion of the line struck a man and caused him to sprain an ankle.

Windlass hazard.—Because a brake band on a windless was too loose, the bitter end of an anchor chain ran off and struck a man's hand, causing a fracture which required treatment on the sick list for 43 days.

Unsafe practice.—While a man on a ladder was painting a ventilator another man below deck turned the ventilator, causing a fall which resulted in a sprained ankle involving disability for 25 days.

Unsafe practice.—An ash bucket was lowered without warning. It struck a man's foot. He was disabled for 10 days.

Unsafe practice.—An improperly adjusted strap on a bucket which was being used to remove ashes from the boat deck to a dock was responsible for a sprained ankle involving 10 days' disability.

Lack of head and eye protection.—A piece of steel entered an eye while a man was drilling a deck with a high-power drill. He was treated on the sick list eight days.

Frequent reports of injuries of this character continue to indicate the need of eye protection in carrying on the work of the Navy and the need for insistence that men engaged in work where flying particles are a danger shall wear protective goggles.

Fall caused by defective ladder.—A ladder reported as constructed of faulty material broke while a man mounted upon it was working on a stack. He sustained a contusion of the leg involving three days' disability.

Falls through open hatches.—Accidents of this kind have been of frequent occurrence. Five cases were reported as occurring in February. In recent months reports seem to indicate an increasing frequency of injuries resulting from falls through unguarded or unlighted and unguarded open hatches. The five cases cited here involved altogether the loss of 72 days' service.

In one instance on board a destroyer a man in going to his quarters after coming off watch at midnight fell through a hatch which was unlighted and unguarded. Two similar accidents occurred in the cases of men walking about ship at night. Another man stepped into an open hatch on board a submarine while crossing the deck

to go below. He struck his knee on the edge of the hatch and went on the sick list for 12 days. On board of battleship a man stumbled as he approached an unguarded hatch leading to a torpedo room. He fell from the berth deck to the torpedo room two decks below, sustaining a contusion of the back.

Hatch covers improperly secured.—A man caught hold of the cover while going up a ladder. It was not firmly secured and it closed on his arm. He sustained a sprain of the wrist which disabled him for 18 days.

Many injuries are attributed to falling hatch covers. In such cases medical officers are expected to ascertain, for the purpose of classifying the accident, whether the hatch cover in question was properly secured.

Defective bacon slicer and unsafe practice.—A man was being instructed by another how to operate the slicer. It had not been operating properly for some time, in that it usually did not start after the switch was turned on until the flywheel was pushed. On this occasion it was started by someone else who had not been noticed. The cutting wheel caused a wound of the hand, requiring treatment on the sick list for 57 days.

Machines in need of repair are always potential causes of accidental injuries, and use of a machine which is not operating as it was designed to operate must be regarded as unsafe practice.

Ignorance.—Six apprentice seamen sustained chemical burns of both hands necessitating treatment on the sick list for two days while using a solution of lye. They had not been warned of the danger. The question arises, should not the injuries have been attributed to negligence on the part of the man or men supervising the work.

Careless handling of firearm.—A man was putting a loaded gun in a locker. The locker door was struck and the piece was discharged. The man sustained a wound of the palm and wrist. He was disabled for 51 days.

Burn caused by careless use of gasoline.—A man working with a blowtorch allowed a gauze dressing on his thumb to become saturated with gasoline. It was ignited by the flame of the torch. He was on the sick list 12 days.

Poisoning by gasoline fumes.—A man used gasoline to wipe up after chipping and scraping in the fore-peak tank. He spent three days in hospital.

Poisoning by roach powder—Unsafe practice.—A chief petty officer, under the impression that he was taking bicarbonate of soda, swallowed roach powder which had been left in the mess room.

HEALTH OF THE NAVY

This report is for the month of June. The summary of health conditions among forces afloat is based upon morbidity reports from ships received prior to the 15th day of the current month. June reports were received from 78 per cent of the vessels comprising the Battle Fleet and 87 per cent of those belonging to the Scouting Fleet.

From these reports it appears that few cases of communicable disease occurred. Only 27 cases of influenza were notified by all fleets. No other communicable disease was reported in significant numbers.

Likewise, at shore stations in the United States no communicable disease occurred in noteworthy numbers.

The following table shows provisional admission rates per 1,000 per annum, entire Navy, for the principal communicable diseases for April, 1925, together with corresponding median rates for the same month, 1920 to 1924, inclusive:

	April, 1920-1924	April, 1925
Cerebrospinal fever.....	0	0
Diphtheria.....	.10	0
German measles.....	3.21	2.50
Influenza.....	78.99	36.55
Malaria.....	7.80	5.43
Measles.....	11.95	1.36
Mumps.....	20.58	9.29
Pneumonia.....	3.56	1.46
Scarlet fever.....	1.32	.52
Smallpox.....	.10	0
Tuberculosis.....	2.98	.84
Typhoid fever.....	0	0

TABLE NO. 1.—Summary of morbidity in the United States Navy and Marine Corps for the month of April, 1925

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75,258	39,682	19,728	114,940
All causes:				
Number of admissions.....	3,337	2,123	1,023	5,460
Annual rate per 1,000.....	532.09	642.00	622.03	570.03
Disease only:				
Number of admissions.....	2,949	1,643	842	4,592
Annual rate per 1,000.....	470.22	496.85	512.16	479.41
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	1,302	650	307	1,952
Annual rate per 1,000.....	207.61	196.56	186.75	193.80
Venereal diseases:				
Number of admissions.....	962	271	200	1,233
Annual rate per 1,000.....	153.39	81.95	121.65	128.73
Injuries:				
Number of admissions.....	311	270	134	581
Annual rate per 1,000.....	49.59	81.65	81.51	60.66
Poisoning:				
Number of admissions.....	77	210	47	287
Annual rate per 1,000.....	12.28	63.50	28.59	29.96

TABLE NO. 2.—*Death reports, entire Navy, for the month of June, 1925*

	Navy, (strength, 95,212)	Marine Corps (strength, 19,728)	Total (strength, 114,940)
Appendicitis, acute.....	1	0	1
Asthma.....	1	0	1
Influenza.....	1	0	1
Malaria.....	0	1	1
Pneumonia, lobar.....	1	0	1
Smallpox.....	0	1	1
Syphilis.....	2	0	2
Tuberculosis, chronic pulmonary.....	1	0	1
Other diseases.....	7	1	8
Drowning.....	6	2	8
Other accidents and injuries.....	5	3	8
Total.....	25	8	33
Annual death rate per 1,000, all causes.....	3.15	4.87	3.45
Annual death rate per 1,000, disease only.....	1.76	1.82	1.77

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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officers, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the BULLETIN should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

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NOS. 3 AND 4

SPECIAL ARTICLES

REPORT OF LEAD POISONING AMONG OXYACETYLENE WELDERS IN THE SCRAPPING OF NAVAL VESSELS¹

By E. W. BROWN, Lieutenant Commander, Medical Corps, United States Navy

(1) INTRODUCTION

The object of the present paper is to present the results of a study of lead poisoning among gas welders employed in the cutting up of old battleships at the navy yard, Philadelphia, Pa. These ships, which have been scrapped in conformity with the limitation of armament treaty, are the *South Carolina*, *Minnesota*, *Delaware*, *New Hampshire*, *Michigan*, and the *Kansas*.

A brief account of the general procedure of the demolition of these old ships may be of interest in this connection. The shipbreaker, after scrapping the ship of her comparatively light and easily detached interior fittings, proceeds to remove the masts, smokestacks, bridges, and superstructure, so as to open up extensive spaces in her upper decks to facilitate her disemboweling. Air-driven socket wrenches run off the heavy nuts, and pneumatic hammers punch the deck bolts and other bolts out of their holes.

Depending on the point of attack, oxyacetylene torches and pneumatic chippers make relatively quick work of the thinner metal fabric. The major part of the cutting and dismantling is done by pneumatic tools and by the fusing heat of the oxyacetylene torch.

Whether the scraps be chunks of armor plate or sections of structural steelwork, none of these can be more than 2 feet long and 18 inches square if they are to enter the open-hearth furnace and be utilized as remelting stock. Accordingly it is self-evident that many oxyacetylene torches must be kept busy in reducing a battleship to a marketable scrap. These great steel bodies, therefore, are converted into scrap metal by burning or cutting out myriads of rivets, by driving out a seemingly endless number of bolts, and by cutting up metallic features of the quondam battlecraft into blocks and conversion into other useful forms.

¹ Received for publication April 22, 1925.

Most of the metal cutting is done by means of the fusing oxy-acetylene torch, which is illustrated in the accompanying cuts. (Figs. 1 and 2.) This apparatus has proved an invaluable aid in ship scrapping, but its employment under certain conditions has been found a serious menace to the physical well-being of the gas welders. This has been notably the case during certain stages of the work inside some of the vessels and especially in compartments no longer ventilated artificially, as was the case when the ship was in commission. During the active life of a normal ship her metal work receives many coats of paint, and the thickness of this built-up veneer has been found to be frequently as much as one quarter of an inch. When the flame of the oxyacetylene torch is applied to melt the metal, a dense smoke is given off. The temperature of the oxyacetylene flame being 3600° F., this readily volatilizes the lead contained in the paint. The inhalation of these fumes naturally involves a serious risk of lead poisoning.

The work consists in applying the oxyacetylene flame by means of a special holder, carrying the burner along the special line of the armor or structural plating to be cut. Poisoning of course can only result where the surfaces have been previously painted with lead paint or when the flame in cutting through comes into contact with red lead caulking, which may be as much as $\frac{1}{4}$ -inch thick. Pneumatic chippers are employed to cut away the paint from the metal as far as possible before bringing the torches into action. This process greatly reduces the volume of smoke, but there are many locations not readily accessible to it. A certain amount of the residue remains after the chipping, and unless the flame is very carefully applied along the line previously chipped it spreads outside of the clean area. The relief obtained, therefore, is only partial.

The Department of Factories and Workshops of Great Britain has also been confronted with the prevalence of plumbism in ship-scrapping operations. Experiments (1) by the principal chemist of the Government laboratory of the department have shown that 49 mgs. of lead per 10 cubic meters of air were given off during a burning experiment in which actual working conditions were closely simulated. This represents the maximum amount which a burner could breathe during a full working day, which is 25 times as great as the daily dose (2 mgs.) which is regarded by Legge (2) as the minimum which may cause chronic plumbism if inhaled daily over a course of years. It was also reported that the approximate quantity of lead inhaled daily by an oxyacetylene cutter in ship scrapping is nearly 14 times greater than that inhaled by a lead burner working on metallic lead alone. The amount of lead in the

fumes varied in these tests with the thickness of the paint, so that from a deck plate of a lighter craft the amount of lead was found to be only half of that from the armor decking of a battleship.

It may be of interest at this point to allude to a statement of Hutton (2) that lead poisoning is the most important industrial poisoning, there being upward of 150 different trades in which workers are exposed. This author, however, does not take cognizance of plumbism in ship-scraping operation. This occupational condition is of comparatively recent development and presents a new problem in industrial hygiene.

The scrapping operations at the Philadelphia Navy Yard began December 15, 1923, and were practically completed February 15, 1925. Lead poisoning, however, was not made a compensable disability by Federal statute until June 6, 1924. Prior to that date, therefore, there was no opportunity to undertake a systematic study of this disability. The period of the present study is comprised between June 6, 1924, and February 15, 1925.

(2) GENERAL STATISTICS

Incidence of plumbism for the period under consideration.—Reference is made to Table 1. The number of men employed per month is shown to vary from 54 in June, 1924, to 67 in December, 1924, the average for the entire period being 76. The total number of admissions per month varied from 1 in June to 23 in October, an average of 12. First recurrences, from none in July to 7 in January, an average of 3; second recurrences, from none in July, August, and September to 2 in December and January. One-third recurrence only was reported in December. In other words, 22 first recurrences occurred among 83 cases, or 26.5 per cent; second recurrences in 7.2 per cent; third in 1.2 per cent.

The total number of working days lost as a result of plumbism was 2,222, or an average of 317 per month. The total number of men employed was 221.

TABLE 1.—General statistics

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Number of men employed.....	64.8	84.2	82.4	83.2	90.5	71.6	67.3	54.2	9.3
First admissions.....	1	15	6	13	23	8	9	8	0
First recurrences.....	0	0	3	2	2	5	3	7	0
Second recurrences.....	0	0	0	0	1	1	2	2	0
Third recurrences.....	0	0	0	0	0	0	1	0	0
Total admissions.....	1	15	9	15	26	14	15	17	0
Total man days.....	1,621	2,105	2,059	1,923	2,352	1,647	1,683	814	261
Days lost.....	5	193	132	364	281	406	297	288	139
Per cent of sick days.....	0.3	9.2	6.4	18.9	11.9	24.6	17.6	35.3	53.2
Annual rates per 1,000.....	225.2	2,601.0	1,595.3	2,644.7	4,055.0	3,102.0	3,255.1	5,830.3	0.0

Percentage of first admissions.....	37.5
Percentage of total admissions.....	50.7
Per cent of first recurrences.....	28.5
Per cent of second recurrences.....	7.2
Per cent of third recurrences.....	1.2
Maximum number of sick days per case.....	69
Minimum number of sick days per case.....	3
Average number of sick days per case.....	20
Period of observation.....	June 6, 1924, to Feb. 15, 1925
Number of men employed entire period.....	221
Number of men employed one week or over.....	201

Annual rates of plumbism per 1,000.—These data are presented in Table 1 and are based on total admissions. These calculations take into account the actual number of working days. The method outlined in the Manual of the Medical Department (p. 296) was employed for the calculation. It will be noted that the annual rate per 1,000 varied from 225 in June, 1924, to 5,930 in January, 1925, the average being 2,578. The excessive rate for January may be partially explained by the compensation factor in view of the impending discharge of men as a result of the close of ship-scrapping operations.

(3) AGE GROUPING OF CASES

Reference is made to Table 2.

TABLE 2.—*Relation to age*

	First ad- missions	Per cent
Number under 21 years of age.....	2	2.4
Number from 21 to 30 years of age.....	52	62.6
Number from 30 to 40 years of age.....	21	25.3
Number from 40 to 50 years of age.....	8	9.6
Number over 50 years of age.....	0	0.0

Total number of men employed, 221.

Relation to previous exposure

Total number with exposure at other plants.....	17
Number with previous history of plumbism.....	2
Total number of first admissions.....	83
Longest period of exposure on job..... months.....	13.2
Shortest period of exposure on job..... do.....	0.23
Average period of exposure on job..... do.....	2.4

Recurrences correlated with first attacks

Total number of first recurrences.....	22
Longest period since first attack..... months.....	3.8
Shortest period since first attack..... days.....	4
Average period since first attack..... months.....	1.8
Total number of second recurrences.....	6
Longest period since first recurrence..... months.....	2.8
Shortest period since first recurrence..... days.....	2
Average period since first recurrence..... do.....	31

The average age of all of the men employed during the entire period of ship scrapping was 28 years, the maximum being 55, the minimum 19; 194, or 62.3 per cent, were between 20 and 30, only five being over 50; 89, or 28.6 per cent, from 30 to 40. It will be noted by reference to Table 2 that 63 per cent of the plumbism cases were between 21 and 30 years of age; 25 per cent between 30 and 40; only 8 per cent were over 40. Legge (4) reports that of 171 cases of plumbism in oxyacetylene burners reported from British scrapping operations 47 were under 25 years of age, 104 under 30, and 67 over 30. The age incidence appeared to correspond in general with the age distribution of these workers. The bulk of the men in the present series were comparatively young.

(4) RELATION TO PRIOR EXPOSURE TO LEAD FUMES

Exposure prior to the present job.—Seventeen of the 83 cases of plumbism reported a varying degree of previous exposure at other ship-scrapping plants. Nine came direct from such work to the present job, the time on the former job having varied from one week to two years before the present work. Two men only gave a distinct history of plumbism in this former work, the attacks having been of acute type but of short duration. None reported symptoms or exhibited signs when examined for employment here.

Exposure in present job before admission.—Reference is made to Table 2. Of the 83 first admissions the longest period of exposure to lead fumes was 13.3 months; the shortest, seven days; the average of all cases, 2.4 months; 12 men had worked less than one month and 12 more between one and two months; 16 between two and three. Of the 22 first recurrences the shortest interval elapsing since the first attack was four days, the longest, 3.8 months; the average, 1.8 months. Of the 6 second recurrences, the shortest period since the first was two days; the longest, 2.9 months; the average, 31 days.

These findings are of great interest in comparison with the 171 cases collected by Legge in Great Britain, already referred to above. Of the 171 cases, 70, or 40.9 per cent, were reported within a year of beginning the burning of paint-covered metal; 20 of these, or 11 per cent occurred in less than three months; reported recurrences in the last four years numbered 16.

(5) BASOPHILIA

The data for basophilia are presented in Tables 3 and 5. All of the blood examinations were made at the clinical laboratory of the naval hospital, Philadelphia, Pa. Examinations of smears for basophilia were made on admission in all plumbism cases, Wright's stain being employed. It will be noted in Table 3 that the degree

of stippling was reported in the first 66 cases as of slight, moderate, or marked grade. In the succeeding 42 cases it was recorded by the scoring system as proposed by McCord, Minster, and Rehm (5) as follows:

- (a) A few stippled cells on the entire slide..... X
- (b) Average of 1 stippled cell in every five fields..... XX
- (c) Average of 1 stippled cell in every field..... XXX
- (d) Average of 4 stippled cells in every field..... XXXX
- (e) Average of 6 stippled cells in every field..... XXXXXX
- (f) Average of 10 stippled cells in every field. XXXXXXXXXXXX

This scale proved to be of considerable value for comparative scoring.

Basophilia in active cases.—Negative examinations resulted in only 13 per cent of the entire series: 31.89 per cent of the first 66 cases showed marked stippling; 28.6 per cent of the last 42 showed a basophilia of 3 plus; and 11.9 per cent, 4 plus. Basophilia is therefore a pronounced feature in the present series of cases. 37.8 per cent were of slight grade and 23.8 per cent were reported as plus 1.

Basophilia unassociated with symptoms of plumbism.—Referring to Table 5, it will be seen that 42 oxyacetylene burners with daily exposure to lead fumes were examined for basophilia in November, 1924. In none of these men were any symptoms alleged: 35.7 per cent were negative for basophilia; 28.6 per cent were 1 plus; 11.9 per cent were 2 plus; 21.4 per cent, 3 plus; and 2.4 per cent were 4 plus. 64.3 per cent, therefore, showed evidence of lead absorption resulting in stippling.

Basophilia in normal persons.—Basophilia is not in any case a disabling condition in itself and has been occasionally reported in apparently normal individuals, as is testified by Oliver (6), Sellers (7), Teleky (8), and Otto Nageli (9), the latter finding it in 21 per cent of healthy persons examined and noting that the number of basophile corpuscles increased after the eating of certain foods.

McCord, Minster, and Rehm (5) subjected the blood of 18 healthy persons to examination. These workers, however, employed a technique designated as the basophilic aggregation test which leads to a clumping of basophilic material in young red cells which can not be demonstrated by staining with Wright's stain. Such stippled cells as appear after Wright's method are preformed in the blood. The stippled cells seen in the basophilic aggregation test are not preformed, but are entirely due to the artificial aggregation of the evenly distributed substance in the young cells. The special method employed is described in detail in their paper. Admitting that the number of individuals is small, they report the percentage showing the basophile granules as 66 per cent, thus exactly coinciding with Schwartz's figure. However, in no case did the basophilia exceed

plus 2 of the scale; in fact the majority of positives were recorded as plus 1. Under their rating scale they place the upper limit for normal persons as 2 plus.

As a series of controls for the writer's findings in 108 cases of plumbism blood smears were taken from 55 apparently normal individuals and examined for basophilia by Wright's stain. This group comprised 31 hospital corpsmen and 24 navy-yard workmen. The entire slide was carefully examined twice in each instance. No evidence of stippled cells in any specimen was found. These results, of course, are not comparable with those reported by McCord, Minster, and Rehm, as the basophilic aggregation test was not used. They are, however, of interest as controls in showing the absence of preformed stippled cells.

Comparison with group of cases at General Metals Supply Co.—Of interest in this connection is a report received December 29, 1924, by the author in the form of a personal communication (10) from the industrial accident commission, department of safety State of California, relative to a recent clinical study of 90 cases of plumbism resulting from the use of the oxyacetylene-cutting torch in scrapping at the plant of the General Metals Supply Co., basophilia was found in only 3 cases, in sharp contrast to the data collected by the writer in his present series. This appears remarkable in view of the similar industrial conditions imposed.

There is much conflicting evidence as to the constancy of basophilia in lead poisoning. Limenthal (11) reports that in nearly 50 per cent of a large number of cases of plumbism in the outpatient department of the Massachusetts General Hospital that basophilic granules were absent.

Harris (12), in a study of 103 active cases noted the absence of basophilia in 88 per cent. He obtained the following results: Of 103 active cases 13, or a trifle more than 12 per cent, showed basophilia; of 19 latent cases 5, or barely 21 per cent, were reported positive; of 27 border-line cases only 4 showed stippling, and of 60 negative cases only 1 was positive. It would therefore appear justifiable to say on the basis of this study that this sign like the lead line is of limited practicable value.

Russell (13) found that 27 out of 100 persons in a compensation status for plumbism had no basophilia. Lutoslowsky (14) found it absent in 15.9 per cent of 107 patients with chronic plumbism. Schmidt (15) found no plumbism in 72.9 per cent of 546 lead workers. Teleky (16) found no basophilia in 31.6 per cent of 79 patients showing blue line and cachexia and subjective symptoms from exposure to lead. Oliver (17) reports absence of basophilia in 75 per cent of his cases of plumbism. These findings are supported by expressions of opinion by Hayhurst (18), Rambousek (19),

Rand (20), Biondi (21), Shie (22), Meyer and Speroni (23), all of whom state that basophilia is certainly not invariably present in lead poisoning. On the other hand, Schnitter (24) reports that all of his cases of plumbism showed stippling and attributes the reported absence in cases reported by others to the fact that fine stippling is obscured by the counterstain to bring it out. Meyer and Speroni (23) found basophilia present one day, absent another.

Others hold that basophilia, while of diagnostic value in conjunction with symptoms of poisoning, is not of itself conclusive. Oliver (6) says that he would hardly recommend suspension from work for this reason. Sellers (7) found that in 22 lead workers the proportion of stippled cells to normal corpuscles had no relation to the incidence of actual poisoning among the cases. Hayhurst (18) considers basophilia of no significance unless it exists to the extent of 1 to every 100 red cells.

McCord, Minster, and Rehm (5) conclude on the basis of their work, that on a quantitative basis clinical cases of lead poisoning regularly exhibit a high basophilic aggregation content of the blood. In fact, they point out that the majority of lead-exposed workers quickly come to have a higher degree of basophilia than is found among normal persons, and that this indicates a preclinical plumbism. If in the routine examination of these lead workers it is found that stippling is increasing, such workers in the absence of other disease should at least be placed on eliminative treatment. They recommend this if the rating is 6 plus or higher. If clinical signs are suggestive treatment is begun at a rating of 4 plus.

Basophilia and diagnosis.—Schonfeld (25) has pointed out that the relative dangers of different lead occupations may be assessed by the incidence of basophilia among the workers. He believes also that the presence of basophilia is of marked diagnostic value. As opposed to this view, Teleky (8) and Rambousek (19), in common with the chief English and American authorities, insist that basophilia is of only supplementary value in conjunction with other signs and symptoms.

Degree of basophilia indicative of lead poisoning.—Certainly, if the evidence from various sources is accepted, there is abundant proof that lead poisoning can exist without basophilia and basophilia without plumbism and even without lead absorption. Schnitter (24) considers that workers with more than 100 stippled cells per million should not be allowed to work in lead and these with 500 are definitely ill. Schonfeld (25) considers that 100 per million warrant a positive diagnosis; that 30 per million are indicative of lead absorption even without symptoms; and 300 warrant suspension from work. Schmidt (26) thinks a diagnosis of plumbism is warranted on basis of 100 basophilic cells per million.

RED BLOOD CELL COUNTS AND HEMOGLOBIN

(6) RED-CELL COUNT

Reference is made to Table 3.

TABLE 3.—Data of blood examinations

BASOPHILIA

	Number	Per cent
Total number of plumbism cases.....	112	-----
Total number of cases examined.....	108	-----
Total number examined without scale.....	66	-----
(a) Total number negative for basophilia.....	9	-----
(b) Slight grade.....	25	37.8
(c) Moderate grade.....	11	16.6
(d) Marked grade.....	21	31.8
Total number of examinations made with scale.....	42	-----
(a) Negative.....	5	-----
(b) 1 plus.....	10	23.8
(c) 2 plus.....	9	21.4
(d) 3 plus.....	12	28.6
(e) 4 plus.....	5	11.9
(f) 6 plus.....	1	2.4
Percentage of cases negative for basophilia.....	-----	13.0

RED-BLOOD CELL COUNTS

	Number	Per cent of total
Total number of cases examined.....	70	62.5
(a) From 5,000,000 to 5,500,000 p. c. m.....	6	8.5
(b) From 4,500,000 to 5,000,000 p. c. m.....	14	20.0
(c) From 4,000,000 to 4,500,000 p. c. m.....	18	25.7
(d) From 3,500,000 to 4,000,000 p. c. m.....	25	35.7
(e) From 3,000,000 to 3,500,000 p. c. m.....	6	8.5
(f) From 2,500,000 to 3,000,000 p. c. m.....	0	0.0
(g) From 2,000,000 to 2,500,000 p. c. m.....	1	1.4

Lowest red-blood count, 2,420,000.

Average red-blood count, 4,178,000.

HEMOGLOBIN

	Number	Per cent of total
Total number of cases examined.....	69	61.2
(a) From 90 to 100 per cent.....	2	2.9
(b) From 85 to 90 per cent.....	9	13.0
(c) From 80 to 85 per cent.....	8	11.6
(d) From 75 to 80 per cent.....	17	24.6
(e) From 70 to 75 per cent.....	11	15.9
(f) From 65 to 70 per cent.....	6	8.7
(g) From 60 to 65 per cent.....	7	10.1
(h) From 55 to 60 per cent.....	6	8.7
(i) From 50 to 55 per cent.....	2	2.9
(j) From 45 to 50 per cent.....	1	1.4

Red-cell counts were made in 70 cases. In analyzing these data with reference to the development of anemia the question arises as to what constitutes the lower normal limit for both the red count and hemoglobin. This is set somewhat arbitrarily as 4,000,000 and 80 per cent, respectively.

Hemoglobin.—This was estimated in 69 cases, the Tallquist method being employed. Seventy-two per cent of the findings are below 80 per cent; 47.8 per cent are below 75 per cent; 31.8 per cent, below 70 per cent; 13 per cent, below 60 per cent; lowest percentage of hemoglobin, 50 per cent; average percentage, 76.1 per cent.

Discussion.—Anemia is one of the commonest conditions noted in the reports of chronic lead-poisoning cases, but there are virtually no data in the literature bearing on acute poisoning of which the present series is a type. Gilman Thompson (27) states that in chronic plumbism the red cells are not often found to fall below 4,000,000 and that the hemoglobin falls to between 75 and 85 per cent—sometimes to 50 per cent. Shie (28) questions whether the characteristic pallor of plumbism in chronic lead poisoning is due to anemia at all and believes the latter is present less frequently than is commonly supposed. In most of his cases the red-blood cells were only slightly below normal. Hemoglobin percentages varied considerably, but, on the whole were not affected by plumbism. None were found below 65 per cent, the majority being between 80 and 100. Harris (12) found a marked secondary anemia in 53 per cent of his chronic cases. In 27 cases hemoglobin was less than 70; among his latent cases, 14 patients were found anemic; in the border-line cases, 24; and among the negative cases, 47.

In the 90 cases of plumbism occurring in ship-scraping reported by the Industrial Accident Commission (10) of California already referred to, the average red-blood count was 4,530,000. With reference to hemoglobin, 32 per cent of the findings were below 80 per cent, 15.5 per cent below 75 per cent, 2 cases between 60 and 70 per cent. The findings in the author's series of 112 cases are in marked contrast to these figures in that anemia is a much more pronounced finding.

(7) BLOOD PRESSURE

The data for blood pressure are presented in Table 4.

TABLE 4.—*Blood pressure*

SYSTOLIC PRESSURE

	Number	Per cent
(a) 170 to 175.....	1	0.9
(b) 165 to 170.....	0	.9
(c) 160 to 165.....	1	.9
(d) 155 to 160.....	1	.9
(e) 150 to 155.....	3	2.9
(f) 145 to 150.....	4	3.8
(g) 135 to 145.....	7	6.7
(h) 125 to 135.....	19	18.1
(i) 115 to 125.....	52	49.5
(j) 105 to 115.....	17	16.2
(k) 95 to 105.....	3	2.9



Fig. 1.—Cutting metal with the fusing oxyacetylene torch



Fig. 2. --Cutting metal with the fusing oxyacetylene torch

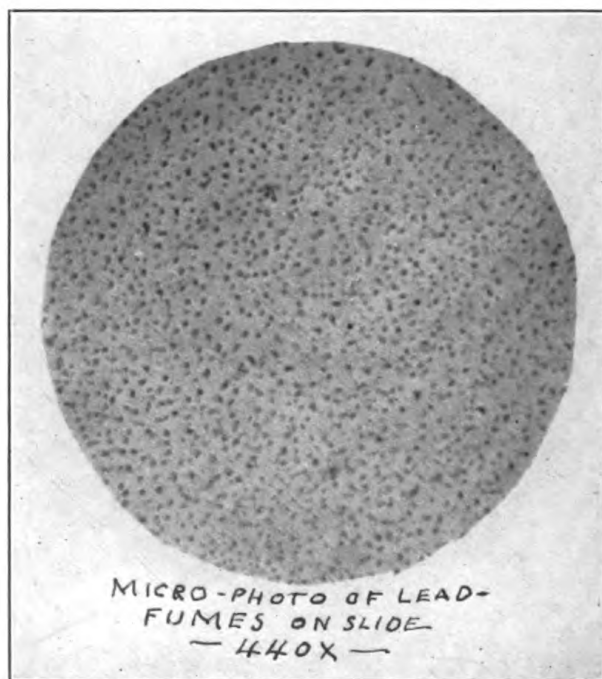


Fig. 3

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TABLE 4.—*Blood pressure*—Continued

SYSTOLIC PRESSURE—Continued

	Systolic	Diastolic
Maximum reading.....	175	73
Minimum reading.....	98	70
Average reading.....	122	74
Total number of plumbism cases.....		112
Total number examined for blood pressure.....		105

DATA ON BLUE LINE

	Number	Per cent
Total number of plumbism cases.....	112	
Total number examined.....	112	
(a) Negative.....	54	48.2
(b) Slight grade.....	30	26.8
(c) Moderate grade.....	16	14.0
(d) Marked grade.....	12	10.7
Total number of positive findings.....		51.8

It may be of interest at the outset to consider certain literature bearing on this aspect of lead poisoning. According to the observations of Legge and Goadby (29) the blood pressure of lead workers tends to be high; in an average of 100 workers with years of exposure to lead, but none showing signs of actual poisoning, the highest pressure was 178, the lowest 105, the mean 150. Collis (30) found the average of 141 smelters to be 148.2 and of 38 white-lead workers 156.5.

Oliver (31) is of the opinion that work in lead tends to raise arterial pressure. In a series of men working in white lead in Newcastle he found that the average blood pressure was 131.4, the highest 180. His impression is that during the early years of employment in a lead factory the work does not affect the blood pressure to any marked degree, but there is hardly any doubt that, as time goes on and the function of the excretory organs is interfered with, the blood pressure rises; also, that structural changes are induced in the arteries, for only by this means can be explained the large number of deaths from cerebral hemorrhage in persons who have worked in lead. The duration of work and the particular habits must materially influence this question of blood pressure.

Harris (32) reports evidences of arteriosclerosis in a total of 63 painters representing 26 per cent of those in whom blood-pressure observations were made. Thirty-six of those persons who had a systolic pressure of 150 mm. or more were active plumbism cases. Of active or latent cases, 44, or slightly more than 39 per cent of those in whom blood-pressure records were made, showed a systolic pressure of 140 or over. The remaining 69 painters, or 61 per cent of the active and latent cases, had a systolic pressure of 130

or less. He emphasizes that the action of lead is a slow one, and it is very likely that this low blood pressure is coincident with that period during which fibrotic changes which lead to the sclerosis of the muscular system are slowly making headway.

Blood pressure in the active cases of plumbism.—Reference to Table 4 indicates that in the present series of 112 cases, of which 105 were examined for blood pressure, only 6, or 5.7 per cent, out of the 105 cases examined exceeded a systolic pressure of 150, the maximum for the series being 175 systolic and 73 diastolic, the minimum, 122 and 74; the average, 122 and 74. In other words, 94.3 per cent of all systolic readings were below 150; 93.3 per cent are below 145; 86.6 per cent at or below 125. The general conclusion is drawn that the type of plumbism here discussed did not exert any definite cardiovascular effects as shown by blood pressure. Reference is made to Table 5.

TABLE 5.—General inspection data: September and November, 1924

	September		November	
	Number	Per cent	Number	Per cent
Total number examined.....	71		62	
Blue line found.....	7	9.8	5	8.1
Blood pressure, maximum.....	S. 166, D. 100		S. 158, D. 88	
Blood pressure, minimum.....	S. 105, D. 52		S. 110, D. 68	
Blood pressure, average.....	S. 127, D. 78		S. 128, D. 79	
Persistent constipation.....	15	21.1	6	9.6

EXAMINATIONS FOR BASOPHILIA

	November, 1924	
	Number	Per cent
Total number of men inspected.....	62	
Total number examined for basophilia.....	42	67.7
(a) Negative.....	15	35.7
(b) 1 plus.....	12	28.6
(c) 2 plus.....	5	11.9
(d) 3 plus.....	9	21.4
(e) 4 plus.....	1	2.4
(f) 6 plus.....	0	0
Negative.....		35.7

Blood pressure unassociated with symptoms of plumbism.—Of the 71 men inspected in September, 1924, the maximum systolic pressure was 166, the minimum 105, the average for the 71 readings being 127. In the November inspection of 62 men the maximum systolic pressure was 158, the minimum 110, the average 128. The number reaching 150 systolic or over was 6 in September and November combined. There was therefore no definite tendency to hypertension shown in the workers without symptoms.

Arteriosclerosis.—There was no indication of fibrosis of superficial arteries, the radial and temporal arteries not being definite palpable in any of these cases. The eye grounds were not examined for signs of vascular changes. Due allowance would, of course, have been made for cardiovascular signs which might be connected with arterial degeneration due to other causes. The question of arteriosclerosis in these cases will be referred to later in the discussion of urinary findings.

In the series of cases reported to the Industrial Accident Commission (10) of California and already referred to there was no development of cardiovascular pathology that could be attributed to lead. Occasional albuminuria of very slight grade and cylinduria were noted. The phenolsulphonethalein renal function test yielded normal findings in these cases. No indication of actual organic renal impairment was found.

(8) THE BLUE LINE ON THE GUMS.

Certain points in the literature will first be briefly referred to. Oliver (33) stresses the distinction which must be drawn between a "true" and a "false" blue line, the latter being more or less readily removed by the toothbrush and therefore particularly associated with carious teeth and gingivitis. According to Oliver "the true Burtonian or characteristically blue line of plumbism is not so readily removed, for it is due to a deposit of particles of lead sulphide inside the cells of the deeper layers of the gums." He also considers that the lead line is not in itself a proof of lead poisoning but rather an evidence of lead absorption and, together with the other symptoms, a valuable-diagnostic sign. Therefore a blue line on the gums by itself indicates rather the presence of lead than lead poisoning, but, as a danger signal and as affording confirmation of the exact etiology and correlated with other symptoms, it is a very valuable sign.

Rambousek (34) expresses substantially a similar view but points out at the same time that mercury, iron, and silver produce a very similar line and that workers in charcoal may also show a superficially similar phenomenon. W. H. Rand (35) reports the blue line as "the most constant of the symptoms of plumbism," but neither inevitable in nor peculiar to it, since in some cases it is lacking. Linenthal (36) reports instances of unquestioned plumbism where there was no sign of the blue line and is of the opinion that it is "extremely rare when the gums are in a healthy condition and when the teeth are cared for." Harris (37) found the lead line in less than 14 per cent of the active cases among 400 painters and states that in his own opinion the blue line is frequently encountered in those whose teeth are kept clean.

Hayhurst (38) points out that the blue line is found in only about one-third of the cases; and while it is a sign of lead absorption and warrants a tentative diagnosis, it does not in itself prove lead poisoning. Shie reports that 90 per cent of all his patients had a well-marked lead line and not invariably associated with bad gums and teeth. He considers all these to be potential cases of plumbism, since the lead line proves absorption of lead.

The blue line in the active cases of plumbism.—Referring to Table 4 of the present study it will be seen that in the 112 cases 51.8 per cent yielded positive findings. It will also be noted that the lead line was slight in 51.7 per cent of the positive cases. In the present series, therefore, the lead line was of only moderate diagnostic significance, only a little over half of the cases showing this sign. Most of the patients, both with and without the blue line, had very bad gums and teeth, pyorrhea and gingivitis being marked; in fact, the great majority admitted that the toothbrush was employed rarely, if at all. A definite lead line was observed in only five cases with excellent teeth and gums.

The blue line without associated symptoms of plumbism.—In September, 1924, 71 burners were examined; 7, or 9.8 per cent, exhibited a definite blue line. In November, 1924, 62 men were inspected and 5 cases of blue line, or 8.1 per cent, found. These were undoubted cases of lead absorption without symptoms.

The writer is strongly of the opinion that the lead line may or may not be present in well-defined plumbism and when observed does not mean that the individual has lead poisoning. Certain individuals were observed with well-marked lead lines apparently free from symptoms of any character. These are all lead absorption cases, however, and if the balance between absorption and elimination were interfered with they would probably develop active symptoms. The same consideration applies to lead in the urine and basophilia without symptoms.

(9) URINARY FINDINGS

Specific gravity, albumin and microscopy.—Reference is made to Table 6:

TABLE 6

Total number of plumbism cases.....	112
Number examined for albumin and sugar.....	78
Number given microscopic examination.....	40
Number positive for albumin.....	4
Number positive for casts.....	2
Number positive for sugar.....	0
Number examined for specific gravity.....	67
Lowest specific gravity.....	1.010
Highest specific gravity.....	1.032
Specific gravity from 1.010 to 1.015.....	15
Specific gravity from 1.015 to 1.032.....	52
Average specific gravity.....	1.020

Lead in urine—Quantitative examination

	Volume of urine (c. c.)	Mgs. found	Mgs. per 2,000 c. c.
1. C. J. C.	1,700	0.14	0.164
2. W. M.	1,740	.32	.367
3. D. K.	1,650	.10	.121
4. R. K.	2,130	.40	.375
5. J. G. B.	750	.10	.266
6. F. B.	950	.09	.189
7. N. C. S.	1,360	.09	.149
8. T. H. A.	440	.04	.181
9. H. A. W.	970	.07	.144
10. D. R.	1,310	.07	.106
11. D. K.	1,960	.06	.061
12. M. V.	1,950	.05	.051
13. J. J. G.	1,070	.27	.504
14. R. G.	2,030	.16	.160
15. H. K.	630	.17	.539
16. F. M. M.	1,430	.36	.503
17. J. I. K.	260	.28	2.153
18. C. C.	1,010	.23	.455
19. H. O.	750	.10	.266
20. H. D.	1,050	.68	1.295
21. L. S.	1,920	1.69	1.760
22. R. R.	1,380	.33	.405
23. O. D.	1,500	.87	.490
24. O. J.	1,500	.68	.910
25. F.	1,500	.46	.610
26. A. W. B.	1,200	.00	.000
The following men had no symptoms of plumbism:			
27. J. T.	1,890	.07	.074
28. A. W. A.	1,910	.29	.303
29. G. W. S.	1,870	.19	.203
Total number examined for lead.....			29
Total number negative for lead.....			1
Maximum quantity of lead per 2,000 c. c.....			2.153
Minimum quantity of lead per 2,000 c. c.....			0.051
Average quantity of lead all cases per 2,000 c. c.....			0.408

Of 112 admissions, 106 cases were submitted to urinary examination for specific gravity, albumin, and sugar. A faint trace of albumin was reported in four instances, but these results were not correlated with low specific gravity, casts, or elevated blood pressure—in other words indicative only of simple albuminuria and not of chronic nephritis. Sugar was uniformly absent in all cases.

Forty microscopic examinations were carried out at the clinical laboratory of the naval hospital. Two were reported as containing a few hyaline casts. The other associated findings of these specimens, as well as the clinical symptoms, failed to indicate any signs of renal pathology. The blood pressures were within normal limits.

The lowest specific gravity, recorded as 1,010, was found in one case only; the highest, 1,032; the average, 1,020. The case with the lowest gravity was unassociated with any sign of renal impairment. Gravity fixation or renal function tests were therefore not indicated. All data may be interpreted under the circumstances as falling within normal limits.

Question of chronic nephritis.—Oliver (39) has found in chronic plumbism that there may be atrophy of the connective tissue and glomeruli of the kidney with hyaline degeneration of the vessels.

In general, the lesions of the kidney are those of chronic interstitial nephritis. It appears to be the consensus of opinion that such pathology is the result of long and protracted exposure to lead over a period of years. On the other hand, where a lead worker dies from acute plumbism after only a few weeks or months there may be an acute parenchymatous nephritis. In the author's series of cases the former lesions would hardly be looked for in view of the relatively short exposure and the acute type of the disability. There were no laboratory signs of any type of lesion. The generally negative character of the urinary findings are in line with what may be anticipated. The lack of significant changes in blood pressure discussed under that heading is in harmony with the lack of pathological changes in the urine.

Lead in the urine.—The quantitative analyses for lead in the urine were carried out by the chief chemist of the supply department of the navy yard. The recent method of Fairhall (40) of the Harvard Medical School, which represents a striking advance, was employed. This greatly simplifies and shortens the older technique with a marked refinement in accuracy.

The lead is quantitatively precipitated from the urine with the alkaline earth phosphates when ammonium hydrate is added. This precipitate is collected, ashed, and the amount of lead present is determined volumetrically by titrating in the form of the chromatic. The need of exaporating the urine to dryness and ashing the residue is thereby obviated.

The quantity of lead excreted in the urine of patients suffering from plumbism is extremely small. As small a quantity of lead as 0.05 mgs. per 2,000 c. c. of urine may be satisfactorily quantitated. Thus Fairhall reports the analyses of the urine of 13 plumbism patients, the volume of urine varying from 3,150 to 15,000 c. c. No lead was found in one; in the remainder, the lead varied from 0.04 mgs. per 2,000 c. c. to 2.153 mgs. per 2,000 c. c.

Lead in the urine of the active cases of plumbism.—Urinary specimens were analyzed from 26 patients, or 30 per cent of the cases. Twenty-four to forty-eight-hour samples were furnished. All data are calculated on the basis of 2,000 c. c. for comparison and are recorded in Table 5. Lead was found in all with one exception. The amount varied from 0.05 to 2.15 mgs. per 2,000 c. c.; average, 0.41 mgs. These results emphasize the extremely small amounts of lead that may be found in the urine in acute cases of this type.

Lead in the urine of men without symptoms.—Samples were collected from J. T., A. W. A., and G. W. S., these men being selected at random; had worked continuously for 13, 10.5, and 10.5 months, respectively; had never been admitted and were symptomatically normal during the entire period. Physical examination was

negative except for a marked blue line in the case of J. T. All three showed a plus 1° of basophilia; red counts and hemoglobin were normal; lead was present in all three urines, as recorded in Table 6.

The presence of lead in the urine is closely analogous to basophilia and the blue line in relation to diagnosis. It does indicate lead absorption, but not necessarily lead poisoning. Such cases, however, should be considered as close to the border-line status. A disturbance in balance of absorption and elimination may at any time precipitate active symptoms of plumbism. Lead in the urine, however, is undisputed proof of absorption, which is not true in the same positive sense of basophilia and the blue line.

(10) PATH OF ABSORPTION OF LEAD IN OXYACETYLENE CUTTING

Examination of the lead fume.—Samples of the lead fume were collected on microscopical slides on which it readily condensed. These samples were examined and photomicrographs taken at the school of public health, Harvard University, through the courtesy of the dean, Dr. Philip Drinker. The figure above presents a photomicrograph taken in high dry power at 440 X magnification. (Fig. 3.)

The fume is seen to consist of enormous numbers of translucent colorless particles, being estimated at about $\frac{1}{2}$ micron for the average diameter (or $\frac{1}{15}$ of the diameter of a red blood cell). The composition is lead or lead coated with a film of lead oxide, the lead being demonstrated by the microscopic test of Fairhall (41). The particles are so dense as almost to be touching, irregular in form and apparently more flaky than globular. Material of such extreme fineness is readily adapted to rapid absorption through the pulmonary alveoli.

Absorption from the gastrointestinal versus the respiratory tract.—The relative amount and rate of absorption of lead from the gastrointestinal and respiratory tracts have been the subject of much experimentation and are an important factor in the etiology of the disease. Authorities differ as to whether lead dust when breathed through the nose and mouth more commonly reaches the stomach or the lungs. Oliver (42), in discussing the question of the inhalation of lead dust, while acknowledging that some of the fine particles are carried into the lungs, considers that the amount must be small. He holds that the bulk of the lead dust breathed is caught in the mouth or throat, there dissolved in the saliva, swallowed and conveyed to the alimentary canal.

On the other hand, in the feeding and inhalation experiments of Legge and Goadby (43) with animals exposed to inhalation of lead

dust, plumbism developed far more rapidly than in animals which were being fed at least ten times as much lead by mouth. Legge and Goadby concluded that apparently small quantities of lead reaching the lungs are much more apt to produce poisoning than larger quantities reaching the stomach. They point out that, from the standpoint of prophylaxis as a measure of industrial hygiene, it is immaterial whether the dust is more apt to reach the lungs or alimentary canal, as it is agreed that the chief source of poisoning in industry is the breathing of dust, and it is against this that prevention should be mainly directed.

During the past few years a group of research workers at the Medical School of Harvard University have been concentrating upon various aspects of plumbism. Their investigations mark important advances in pathology, pathogenesis, and treatment.

Two striking contributions to the subject under discussion were made recently by Minot and Blumgart of this group. Experimenting with cats and employing lead-carbonate dust, Minot (44) found that much of the lead entering the gastrointestinal tract is not absorbed but either is excreted directly or caught by the liver and then eliminated. Very large doses, 50 mgs. per kilogram three times a week, are required to poison a cat when given orally, and must be given for weeks before symptoms of intoxication occur. Absorption from the respiratory tract, on the other hand, is very rapid and dangerous.

Blumgart (45), working in the same laboratory, found that within 24 hours a relatively large quantity of lead could be absorbed by the organism when the only path of entry was through the nose and mouth. This was done by tying off the esophagus of cats and inserting a canula into the trachea, through which the animal breathed, thus preventing all inhaled substances from entering the lungs or stomach. Lead-carbonate dust was rapidly absorbed when sprayed into the nostrils, as proved by post-mortem analysis of the various organs of the body for lead. The possibility of absorption of lead through the nasopharynx in industry is thus opened up.

Injection of lead into the trachea and into the lungs of animals prepared in this way lead to similar results. As much may be absorbed from one injection into the respiratory tract in one day as from gastrointestinal exposure for months. The rapidity of absorption was marked and was shown not only by the quantity absorbed but by the rapid appearance of the lead line and other characteristic symptoms. The reason for the great rapidity of absorption from the respiratory tract is that by this route lead enters directly into the general circulation instead of passing through the liver, as in gastrointestinal absorption. It thus reaches the vulnerable tissues with far greater ease and rapidity.

In view of the above considerations it would appear that the lead contained in the fumes from oxyacetylene cutting, particularly in view of the extreme fineness of the particles, would pass to the lungs to the practical exclusion of the gastrointestinal route. Such rapid access to the general circulation makes clear the relatively rapid development and character of the symptoms which characterized this entire group of cases.

(11) SYMPTOMATOLOGY

Four representative case histories which are typical of the forms encountered in this study will first be cited.

Case No. 1.—J. McA., severe type; admitted at the navy yard, July 10, 1924; age, 34; no previous work at other ship-scraping plants; exposed to fumes for a period of 50 days; has complained of constipation, occasional slight griping pains about umbilicus, and loss of appetite for the past two weeks; suddenly seized with severe pain in lower abdomen; nausea and vomiting, headache, vertigo, and general weakness; moderate blue line; marked basophilia; red count, 3,500,000; hemoglobin, 60 per cent; urine shows a trace of albumin and a few hyaline casts; not examined for lead; blood pressure, systolic 132, diastolic 78. The acute abdominal pain rapidly subsided; no vomiting after the second day. Returned to work under observation, symptomatically well in 13 days. Recurrence August 28 with symptoms of the same type much less severe; transferred to hospital, returned to work in 69 days apparently recovered; he had a second recurrence October 12.

Case No. 2.—J. J. K., moderately severe type; September 2, 1924; age, 29; no previous work at other ship-scraping plants; present exposure, 6 months and 8 days; persistent constipation for 6 weeks; cramp-like pain in lower abdomen from time to time for 10 days, but not severe enough to incapacitate; the pain suddenly became aggravated, and he had four attacks of vomiting in 48 hours; metallic taste in mouth; vertigo and weakness; a slight red line; red count, 4,000,000; hemoglobin, 65 per cent; slight basophilia; urine negative; blood pressure, systolic 136, diastolic 70; ambulatory throughout; the acute symptoms rapidly subsided; returned to work in 21 days free from symptoms; continued at this work for 46 days; no recurrence reported.

Case No. 3.—A. H. B., mild type; age, 24; December 27, 1924; oxyacetylene cutting at a ship-scraping plant for 6 months, 18 months ago; present exposure, 2 months; moderate constipation for 1 month; tiring easily during past 10 days; slight griping pains about navel began 4 days ago; pain suddenly increased December 26; nausea and vomiting at intervals for 2 days; no head-

ache at any time; metallic taste; symptoms had largely disappeared by third day; marked blue line; basophilia, 4 plus; red count 4,000,000, hemoglobin 60 per cent; urine negative for albumin and casts; specific gravity, normal; lead in the urine, 0.54 mgs. per 2,000 c. c.; dynamometer, right 170; left 166; discharged to work, symptomatically well, in 15 days; no recurrence reported.

Case No. 4.—H. D., anemic type; November 5, 1924; age, 41; no previous exposure at other ship-scraping plants; present exposure at this yard, 1 month and 27 days; constipation of mild degree for past month; for past 2 weeks, conscious of tiring easily with palpitation; discomfort, rather than pain, in lower abdomen; dull pain in the knees; metallic taste; just perceptible blue line; basophilia, 6 plus; red count, November 5, 1924, 3,500,000; hemoglobin, November 5, 62 per cent; December 2, 45 per cent; urine negative for albumin and casts but contained 1.295 mgs. of lead per 2,000 c. c.; dynamometer, right 165, left 158; blood pressure, systolic 116, diastolic 65; transferred to hospital and discharged in 41 days, symptomatically well; resigned from the yard on discharge.

The great bulk of the cases correspond to the general clinical picture of case No. 3. The cases, however, may be classified into three general groups, as follows:

1. Active or positive cases of plumbism, the clinical and laboratory findings being clear cut and sufficient on which to base a positive diagnosis.

2. Border-line cases: In these the clinical findings were only suggestive, but the physical and laboratory signs of lead absorption were positive.

3. Latent or inactive cases: These were definitely asymptomatic, but undoubted signs of lead absorption were present, such as basophilia, lead line, or lead in the urine. None of these cases were admitted, but when discovered at inspections were placed under supervisory control and eliminative treatment.

General complaints.—Reference is made to Table 7. The number of cases presenting the symptoms indicated are designated as follows:

TABLE 7.—*Symptomatology*

GENERAL

	Yes	No	Per cent
Weakness.....	29	83	25.8
Loss of weight.....	19	93	16.9
Pallor.....	9	103	8.0

TABLE 7.—*Symptomatology*—Continued

DIGESTIVE			
	Yes	No	Per cent
Abdominal pain.....	107	5	95.5
Constipation.....	85	27	75.9
Anorexia.....	58	54	48.2
Vomiting.....	39	73	34.8
Nausea.....	43	69	38.4
Distension.....	18	94	16.0
Metallic taste.....	22	90	19.6
Diarrhea.....	0	112	0
SENSORIAL			
Headache.....	54	58	48.2
Vertigo.....	21	91	18.7
Fainting.....	0	0	0
Insomnia.....	15	97	13.3
Depression.....	8	104	7.1
Mental confusion.....	0	112	0
Memory failing.....	0	112	0
NEUROMUSCULAR			
Pains in joints.....	17	95	15.2
Pains in chest.....	12	100	10.7
Muscular cramps.....	5	107	4.5
Tremors.....	2	110	1.8
Paralysis of hands or wrists.....	0	112	0
Anaesthesia or paraesthesia.....	0	112	0

Total number of plumbism cases, 112.

General weakness in varying degree occurred in 25 per cent of the cases; loss of weight based on statements of patients in 16.9 per cent, this figure being accepted with some reservation; pallor in 8 per cent and, therefore, not a pronounced feature.

Digestive symptoms.—Abdominal pain, the most frequent of this group, was reported in 95.5 per cent of the cases. This varied widely in intensity—i. e., from severe colic, wholly incapacitating the patient, to slight griping or dull pain. As a rule it was not sufficiently severe to be designated as colic; in the majority of instances localized in the umbilical region; in others, generally in the lower abdomen; in still others, localized in the epigastrium. Some patients described the attacks as entirely irregular as to time and frequency; others reported the attacks as more apt to appear during the night; in other cases it appeared to be initiated by eating or it would be continuous over the 24 hours with remissions and subsequent return. In a considerable number after the acute stage had passed it would appear at regular intervals after meals.

Constipation.—This was present in 75.9 per cent of all cases. It was usually reported as having been present in varying degree for several weeks prior to the attack. In other well-defined cases it was not present at any time. It will be noted that diarrhea, rarely reported by some observers, was not present in this series. Practically all patients stated that it had been their practice to take

Epsom salts once or twice a week regularly since being engaged in the work. The impression appeared to be prevalent that this measure would have a prophylactic effect.

It will be noted by reference to Table 5 that 21.1 per cent of the gas welders inspected in September, 1924, complained of persistent constipation; in November, 9.6 per cent.

Abdominal examination.—This failed to bring out any general or localized tenderness or spasm in any of the cases reporting abdominal pain.

Anorexia was reported in nearly half of the series; vomiting in 34.8 per cent, nausea in 38.4 per cent, metallic taste in 20 per cent, and complaint of distention in 16 per cent. Vague symptoms of indigestion were common sequelæ.

Sensorial symptoms.—Nearly one-half (48.2 per cent) reported headache, usually frontal and bilateral, occasional temporal, and often associated with pain in the eyeballs. There was great variation in severity and duration—lasting from a few days to a few weeks, at times continuing as the outstanding symptoms after abdominal pain had largely subsided.

Vertigo was present to the extent of 18.7 per cent and usually in a mild transient form occurring during the first few days. Acute syncope was not reported. Insomnia appearing in 13 per cent of the cases appeared to be a nervous symptom and not incident to abdominal pain or headache. Mental depression was noted in a few scattered instances, but only to a slight extent.

Neuromuscular symptoms.—Pains in the joints in the order of frequency were referred to knees, hips, shoulders, and elbows, the pains being of a dull character and not persistent, not correlated with any previous history of arthritis, tending to recede with the subsidence of digestive symptoms. In two instances the pain persisted, outlasting all other symptoms. Such pain was probably myalgic in character, as it showed no tendency to follow the course of the nerve trunks. Pain in the chest was reported in 10.7 per cent of the cases with no typical location, in some instances substernal and associated with bronchial irritation, apparently resulting from the inhalation of fumes. In other instances it was referred to the front and sides of the chest, usually described as a soreness rather than actual pain.

Muscular cramps.—There were five cases, all of short duration, the pain being referred to the calves of the legs and not correlated with pain or weakness of the feet. The attacks were prone to start suddenly when the patient was sitting or lying and were often relieved by walking.

Tremors.—In two cases tremors of the coarse type and confined to the hands were observed, not coincident with any other nervous

symptom and disappearing with the clearing up of other manifestations.

Paresis of hands or wrists.—No indication or complaint on examination in any of the cases in this study, no suggestion of weakness of ankle joints in any instance.

Determination of strength of hand grip.—This was tested by means of a hand dynamometer of the Collin type, the scale or "Eschelle de traction" reading from 0 to 200. This was first standardized with 55 normal subjects made up of hospital corpsmen and navy-yard workmen with no history of exposure to lead. The maximum and minimum readings for the right hand were 185 and 95, respectively, the average 143; for the left hand 180 and 95, average 135. To secure uniform conditions each subject was required to stand erect, the arm fully outstretched horizontally and the hand under test rather slowly contracted to maximal power and then released. This was repeated to insure that the maximal power had been attained. This method was used by Hayhurst (46) in his examination of 100 painters.

Fifty of the first admissions for plumbism were tested in this manner; the maximal, minimal, and average data for the right hand were 190, 70, and 133; for the left hand 181, 68, and 122. The average for the right hand of the plumbism group was 10 points lower than for the control group; for the left hand 13 points lower. However, in view of the wide variations recorded in the control readings it is considered that the differences between the two groups are not sufficient to be significant. It appears to be established that no evidence of paresis or early extensor paralysis of the fingers is brought out in these tests.

Determination of the wrist extensors.—This technique was as follows: The palm of the examiner was placed upon the dorsum of the patient's outstretched hand; it was then noted whether the patient could be prevented from lifting his hands without flexing the wrists or joints. In 50 cases examined by this method no instance of incipient or established extensor paresis could be detected.

Anesthesia or paresthesia.—Such sensory symptoms could not be elicited in any of this plumbism group.

Ocular and auditory symptoms.—The eye grounds were not examined, but no symptoms were reported at any time suggestive of optic neuritis or other toxic eye conditions. No auditory disturbances were discovered.

Nervous symptoms in relation to duration of exposure.—The 112 cases under discussion are notable in that there is an entire absence of any signs of paresis or paralysis. The question naturally arises—Had the period of exposure been too brief to induce such nervous

manifestations? The period of previous exposure for this group varied from 7 days to 13.2 months; the average 2.4 months.

There are practically no references in the literature bearing on this phase of the subject. In a personal communication to the writer, Dr. T. W. Legge (4), the senior inspector of factories and workshops of Great Britain, discusses the increasing number of cases of lead poisoning in ship scrapping in Great Britain during the last few years. He states that nearly all of the cases are reported as first attacks, suffering, in the main, from acute colic and very few from the symptoms of chronic lead poisoning, such as wrist drop and chronic nephritis. He emphasizes, however, that, none the less, there can be no doubt that with repeated exposure these disabling manifestations, which generally do not develop with less than five years' exposure to the cumulative action of lead, will appear in time.

Dr. W. D. Shie (47) in a letter to the writer states that it is impossible to put a limit on the time that a patient may absorb lead before he develops nervous manifestations. There are a great many factors which enter into this question, the most important of which is personal idiosyncrasy. One patient might develop the nervous type of plumbism in a few weeks or months, while the man working beside him might not show signs referable to the nervous system for years.

Dr. Alice Hamilton (48) is of the opinion that in a group of cases such as these under discussion one would not expect increased blood pressure or other signs of nephritis so early and that as a usual thing lead palsy is rather slow in developing.

The writer is of the opinion that while these cases are of the acute type they would in all probability develop signs of chronic plumbism, such as chronic nephritis with hypertension and lead palsies, if the inhalation of lead fumes continued over a period of years, due allowance of course being made for idiosyncrasy.

Comparison with California group of cases.—Reference has already been made to the group of cases reported by the Industrial Accident Commission (10) of California. This is a study of a group of cases resulting from the use of the oxyacetylene-cutting flame during the demolition of battleships at the plant of the General Metal Supply Co. of the Pacific coast. The report is dated December 29, 1924, and covers the experience of eight months, with an average daily pay roll of 135 employees and 90 cases of plumbism. Recurrence cases, of which there were 10, are included in the series.

Digestive symptoms.—Loss of appetite, the complaint of a metallic taste, nausea and vomiting, and umbilical pain were fairly constant symptoms in those admitted. This has appeared usually after three or four months' exposure in the more susceptible individuals

and in several cases has been noted earlier. The majority have had colic. A few have shown definite signs of lead intoxication without complaint of colic. Vomiting has usually accompanied the paroxysms. Constipation has generally been the rule, yielding rather readily to treatment. The duration of the attacks of colic has never been prolonged, the severity decreasing rapidly after the first few days.

No signs or symptoms referable to the respiratory tract or cardiovascular system were present. Occasional albuminuria was noted, but no indication of actual renal impairment were found in any case. Vague transient joint pains were occasionally noted, but no objective signs of arthritis were found.

Nervous system.—Paresis or paralysis was not found in any of the cases. A slight tremor of the hand was observed in a few instances. Headaches and insomnia were infrequent. Pains of indefinite and vague character, more or less transient were now and then alleged. No definite involvement of the optic nerve was demonstrated although vague symptoms of blurred visions and photophobia were complained of in a few instances. Ophthalmoscopic examinations in such cases revealed a mild neuroretinitis, which could well be interpreted as due to other causes than lead. Cerebral symptoms were entirely lacking.

The general clinical aspect of this group is, in the main, quite similar to the writer's group, the outstanding symptoms being gastrointestinal. The data for blood examination, however, are quite different in the two groups; in the writer's group, basophilia in various grades was far more pronounced and a higher proportion of cases showed reduction of red-cell count and percentage of hæmoglobin.

It should be stated in connection with symptomatology that the compensation factor has introduced a certain difficulty in the handling of these patients. Undeniably there has been exaggeration of symptoms either consciously or unconsciously by certain patients. Complaints have been alleged which on investigation have not been found to rest on a pathological basis, and care has been exercised to exclude such cases from an actual diagnosis of plumbism so far as has been possible. Certain individuals, for instance, have presented a self-made diagnosis of plumbism who, on careful study, were found to show no signs of lead absorption, such as the blue line, definite changes in the blood picture, and lead in the urine.

(12) PREVENTIVE MEASURES

The preventive measures employed at this yard are considered under four headings, viz: (1) Physical examination of candidates for employment in oxyacetylene cutting, (2) medical inspection of

employees, (3) instruction in personal hygiene, and (4) protective devices to prevent the inhalation of lead fumes.

(1) *Physical examination of candidates.*—In addition to the usual complete physical examination, all men were carefully scrutinized as to the general aspect, for evidence of a blue line, and the status of finger and wrist extension. They were carefully questioned as to the length of previous exposure, if any, to oxyacetylene cutting of paint-covered metal and as to previous history of plumbism. No men were accepted with a definite history of chronic lead poisoning or presenting any signs of lead absorption.

(2) *Medical inspection of employees.*—These medical inspections were carried out with a view of eliciting cases of lead absorption or incipient cases of plumbism in order that therapeutic measures might be taken before the onset of pronounced symptoms. This examination included all men engaged in this work and comprised the following: General appearance, particularly with reference to color and gait; the mouth and gums, particularly for signs of a blue line, gingivitis, and carious teeth; the presence or absence of hand tremor; the testing of the extension power of fingers and wrists; and examination of blood for basophilia in doubtful cases. In November, 1924, however, all men were examined for basophilia. The status of the bowels, appetite, presence of headache, abdominal pain, and beginning weakness were carefully inquired into.

Workers showing definite symptoms or marked signs of absorption were immediately admitted for treatment. Doubtful or borderline cases were kept under observation and treatment. In view of the compensation consideration a certain difficulty was met with at times in arriving at a diagnosis. It was also realized that these workers are, as others, subject to diseases and intoxications arising from other causes than work and producing certain symptoms identical with plumbism. A distinction must be made between "caused by the occupation" and "concomitant with."

(3) *Hygienic instruction.*—This covered such matters as regulation of the bowels, special attention to dental cleanliness, and the prompt reporting of incipient symptoms. The usual precautions of scrupulous hand washing before eating and the changing of clothing for work were mentioned as desirable in a general way. Such measures, of course, have no preventive value, as the mechanism of lead poisoning in this study is by inhalation and not by mouth contamination through the handling of food or cigarettes.

(4) *Protective devices.*—The crux of the whole question of prophylaxis lies in the use of an efficient mask or respirator which will filter out the minute particles of the volatilized lead. A detailed report on this phase of the subject prepared by the safety engineer

of the navy yard, Philadelphia, Pa., has already been submitted by the industrial manager to the Navy Department.

In order to cut down the extent of fumes production as far as possible, the paint is first chipped away in the line along which it is intended to cut. The flame, however, tends to spread beyond this area, and there is always a certain amount of residue after chipping. It is furthermore impossible to remove the red lead between the plates in the case of armor decking.

On account of the extreme fineness of the volatilized lead, the ordinary respirator, such as the sponge type designed for holding back dust, is entirely useless, as was brought out by actual experience in this work. The following types of masks were investigated by the department of safety engineering of the navy yard:

(a) The La France No. 1300 sponge-filter-type respirator, aluminum frame.

(b) The La France No. 1300 aluminum-frame respirator with special cup for holding sponge, cotton filter, and activated charcoal.

(c) Respirator mask, sponge type, aluminum frame with pneumatic face cushion similar in design to (b).

(d) Standard Junior mask with colored lenses, shade suitable for oxyacetylene cutting.

(e) Modified Burrell industrial gas mask, the face piece being replaced by a soft-rubber respirator with type GMC-1 canister and with rubber respirator in lieu of the rubber face mask.

(f) The Mine Safety Appliance Co., standard mask, type M-S-A. This mask was furnished with 50 feet of oil-proof hose in two 25-foot sections. The face piece, which was made of rubber, was provided with suitable colored lenses. The mask was furnished in substantial reinforced trunk designed to hold a hand-operated blower for supplying a continuous stream of fresh air to the operator. The above devices are all illustrated in the report of the safety engineer.

The Burrell modified industrial gas mask with type GMC-1 easily proved to be the most satisfactory design tested. The canister contains four absorptive layers in the following order from the bottom up: Soda-lime and charcoal, cotton, soda lime, charcoal; the cotton layers being one-half inch in thickness.

The average life of this GMC-1 canister was found to be $6\frac{3}{4}$ days.

Absorption of the lead.—Five Burrell canisters after being fully exhausted were examined by the chief chemist of the supply department of the yard, the successive soda-lime, charcoal, and cotton layers being analyzed for lead. No lead whatsoever could be detected in the soda-lime charcoal mixture, all being caught by the

lower cotton layer. The soda-lime charcoal stratum, however, was found to absorb certain other constituents of the fumes and to distribute the lead over the entire surface of the pad. This was demonstrated by testing the canisters with cotton layers without the chemical. The time capacity was strikingly reduced, the cotton layers becoming clogged much more rapidly by nonlead constituents of the smoke. This type of device was provided with a face piece separate from the goggles, a distinct advantage from the standpoint of comfort. This apparatus was first used November 21, 1924, and, while a distinctly superior type from the standpoint of breathing comfort, it failed to reduce the incidence of plumbism.

It is believed, however, that the prevalence of plumbism would have been lowered if literally all of the burners could have been induced to wear the masks at all times when exposed to fumes. The psychological difficulties in persuading the workers to wear the masks are in the main due to certain discomforts. The air resistance to the filters and conduits leads to inconvenience in breathing; stooping over and working in closely cramped positions aggravates this. It is therefore very difficult to enforce the wearing of such masks. Some of the workers reported difficulty in fitting the masks properly in certain positions, with a consequent leakage at times around the face pieces.

It is believed that there is still considerable room for the development of a mask with improvement in comfort and efficiency. The chief object would be to reduce the air resistance to secure a greater degree of breathing comfort. Laxity in wearing of the device would then be greatly reduced.

It is difficult, in fact, practically impossible to prevent plumbism entirely in this industrial process. The risk, however, can be greatly minimized by constant attention to the various prophylactic measures above discussed.

(13) SUMMARY

(1) *Etiology*.—The lead poisoning in this study was induced by the inhalation of lead volatilized in fumes arising from the burning of paint adherent to scrap metal in the process of cutting by the oxyacetylene torch. The lead particles are extremely fine, being about one-half micron for the average diameter, or one-fifteenth of the diameter of a red blood cell.

(2) *Admissions*.—Eighty-three first admissions of plumbism over a period of observation approximating 8 months—i. e., from June 6, 1924, to February 15, 1925; 29 recurrences; total of 112 cases; number of men employed the entire time, 221; number working not less than one week, 201; average period worked per man, 3.6 months;

37.5 per cent of first admissions and 50.7 per cent of total admissions based on 221 men; 41.2 per cent and 55.7 per cent based on 201 men.

(3) *Ages*.—The ages of all employees ranged from 19 to 55; 62 per cent between 20 and 30 years; 29 per cent between 30 and 40 years; average age of all men employed, 29.1 years; average age of all admitted with plumbism, 28.6 years.

(4) *Periods of exposure*.—Of the 83 cases of plumbism, the shortest period was 7 days; the longest, 13.2 months; the average, 2.4 months. Of the 22 first recurrences, the longest interval was 3.8 months; the shortest, 4 days; the average, 55 days. The comparatively short periods of exposure are accounted for by the fact that the lead gains direct access to the circulation by inhalation.

(5) *Duration of disability*.—Varied from 3 days to 69 days; average 20 days. Eleven cases were transferred for hospital treatment.

(6) *Annual rates per thousand*.—For first admissions varied from 225.3 in June, 1924, to 5,830 in January, 1925; average, 2,577.6; for total cases, 225.5 in June, 1924, to 3,580 in January, 1925; average, 1,742 for first admissions only.

(7) *Basophilia*.—(a) In plumbism cases, in varying degree from slight to marked; in general a pronounced feature; only 12.5 per cent were negative. As a control the blood of 55 apparently normal persons was examined by identically the same technique and no stippled cells found in any instance. (b) In burners exposed to fumes but without symptoms 64.3 per cent showed positive findings.

(8) *Blue line*.—(a) This was positive in varying degree in 51.8 per cent of 112 cases; (b) seventy-one men symptomatically normal examined in September, 1924, showed a blue line in 9.8 per cent; 62 men in November, 1924, in 8.1 per cent.

(9) *Red-cell count*.—Anemia present in varying degree; below 4,000,000 per cubic millimeter in 45.8 per cent of 70 cases; 44.3 per cent between 3,000,000 and 4,000,000 per cubic millimeter.

(10) *Hemoglobin*.—Seventy-two and five-tenths per cent of 69 cases below 80 per cent; 40.5 per cent of these cases between 70 per cent and 80 per cent; 31.8 below 70 per cent.

(11) *Cardiovascular data*.—(a) Systolic blood pressure in 105 cases varied from 98 to 175; average, 122; only 5.7 per cent of cases in excess of 150. (b) Seventy-one burners symptomatically normal in September, 1924, showed a maximum of 166; minimum of 105; in November, 1924, the corresponding data were 158, 110, and 128. Definite cardiovascular effects, therefore, were not observed.

(12) *Renal pathology*.—(a) No indication of nephritis lesions; in 78 cases faint traces of albumin reported in four not associated with other signs of renal pathology; of 40 microscopic examinations, casts were reported in 2, not associated with albumin or low specific

gravity. No indication of tendency to fixation of specific gravity found.

(b) *Lead in the urine.*—(a) Of 26 quantitative examinations in plumbism cases, lead was found in 25 cases; average quantity, 0.41 mgs. per 2,000 c. c. of urine. (b) Three examinations were made in men without symptoms, all with positive results.

(13) *Symptomatology.*—(a) In general the cases were of an acute type but not excessively severe; usually preceded by persistent constipation; onset with nausea, vomiting, headache, and abdominal pain, with rather rapid subsidence of acute symptoms; a moderate grade of basophilia and anemia commonly associated.

(b) Paralysis or paresis of fingers and wrists absent; anesthesia or paresthesia absent; dynamometer tests for the strength of hand grip showed no definite impairment as contrasted with 55 controls.

(c) The periods of exposure were not sufficiently long to induce chronic plumbism with cardiovascular and renal impairment or the paresis and paralysis commonly observed in cases exposed to absorption of lead for a period of years.

(14) *Preventive measures.*—The essential requirement is a protective apparatus to prevent the inhalation of the lead fume. Among the various devices tested the modified Burrell industrial gas mask with type GMC-1 canister was found to be decidedly the most efficient.

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COMBINED METHODS OF TREATING MALIGNANT DISEASE

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General hospitals do not as a rule care to admit sufferers from malignant disease to their wards. This is natural, since such patients are often unsightly, malodorous, and objectionable to other patients. For this reason the care of such sufferers, vastly important as it is, frequently is neglected. Consequently a hospital for the exclusive care for victims of malignant neoplasms is a matter of considerable importance. In 1922 such an institution, the William L. Clark Hospital, was opened in Philadelphia. Here the unfortunate sufferer is welcomed, and because all the efforts of the staff are directed toward the cure or relief of closely allied conditions he is assured of receiving the benefits of the most modern and approved methods of treatment.

It was recently my privilege to spend two weeks observing the work at this hospital, and this paper is an attempt to describe the work done there by Doctor Clark and his staff. Grateful acknowledgment is here made of the kindness and courtesy of Doctor Clark and his associate, Dr. J. Douglas Morgan. These busy men devoted many hours of their valuable time to my instruction, showing me their patients, photographs, records, and technic. The information contained in this report was largely obtained from Doctors Clark and Morgan. The illustrations are, with few exceptions, from the hospital collection.

The hospital is of brick construction, four stories high in the front and five in the rear. Nineteen rooms, single and double, provide beds for 29 patients. There are operating rooms for major and minor surgery, elaborate X-ray equipment, and apparatus for the various methods of applying radium. The personnel, equipment, and organization are in all respects adequate for a modern hospital.

All patients admitted to the hospital are given a complete physical examination with laboratory studies. Thus the constitutional conditions, such as lues, diabetes, and hemophilia, which might influence the choice of the method of treatment or the progress of the patient, are detected.

Until recent years surgery was practically the only method used in the treatment of malignant growths. Since the advent of the Röntgen rays, radium, and electrothermic methods these agents have not only supplemented but in many instances entirely replaced it. Each of these methods has its own field of usefulness in which it excels, but many malignant cases are best treated by combining two or more of these methods according to the indications in the individual case. Comparatively few should be treated by one method

alone. The type, location, and extent of the involvement are the determining factors.

SURGERY

While the scope of surgery in the treatment of malignancy has been greatly reduced by the discovery of other methods, it still holds an important place, either as the primary agent or as an accessory to the use of other agents. Some deep-seated lesions may require exposure by incision before the application of radium or electrothermic methods is possible. Preliminary ligation of large vessels may be necessary prior to destruction of large growths in their neighborhood. The external carotid and even the common carotid have been ligated in several cases before destroying large growths of the neck, buccal tissues, jaw, or tongue. No untoward effects were observed, and it is considered a comparatively safe procedure to ligate the common carotid in the young or middle aged, though there is grave danger of causing hemiplegia in the aged.

In distinctly operative cases, breast amputation is still routinely done after the growth and neighboring lymphatics have received thorough radiation treatment. In cases where the diagnosis is doubtful, but the growth encapsulated and probably benign, it is customary to expose the growth surgically and remove a portion for rapid diagnosis by frozen section. The report of the pathologist determines, to some extent, the further procedure. Postoperative radiation always constitutes a part of the treatment for breast malignancy. In cases too advanced for operation, with extensive metastasis, radiation treatment alone or in combination with electrothermic methods is used.

Tracheotomy, followed by laryngotomy, is frequently done to facilitate diagnosis and treatment of malignant disease of the larynx. Successful laryngectomy has been done in several patients in whom the growth was found to be extensive. No recurrence was noted in several years in some of these cases, though there was recurrence in others. Experience has shown that it is not good policy to treat malignant disease of the larynx without surgical exposure. It is impossible to treat the lesion properly through the mouth, even when an endoscope is employed, since no matter how expert the operator may be it is quite probable that some of the involved structures will be overlooked. It is difficult to treat the disease alone without damaging the healthy tissues unless the lesion is exposed by laryngotomy.

Cancer of the pylorus has been treated in one case by gastroenterostomy followed by stitching the pylorus to the abdominal wall and inserting radium needles extraperitoneally. After the needles were removed the pylorus was released and the abdominal

wall closed. The patient recovered and has remained free from the disease for five years. The majority of these cases, however, are treated with short-wave-length X rays, with or without gastroenterostomy, depending upon the extent of the involvement.

Malignant disease of the mouth and antrum may require a combination of all methods. In several cases of squamous-cell carcinoma involving the palate, antrum, and ethmoid bone, X rays or radium were applied first, then a flap was raised and the diseased tissue, including the palate and malar bones, was destroyed by electrocoagulation. The flap was then replaced and more radiation treatment followed.

Operative surgery in combination with other methods is practiced for resection of a portion of the bowel for carcinoma; hysterectomy for cancer of the uterine fundus; amputation of arms or legs in rapidly growing sarcoma or carcinoma; resection of glands and other cases in which it may be indicated.

RADIATION METHODS

Radium and X rays are used alone, together, or in combination with surgery or the electrothermic methods, according to the indications in the individual case.

The use of radiation therapy is based on the fact that cancer cells are less resistant to the rays than are healthy cells. Doyen says that the fact of the lower vitality of the cancer cells dominates the whole question of the local treatment of cancer. The more embryonal or undifferentiated the type of cells, the greater is the susceptibility of the tissue to radiation or heat, while the more differentiated and highly specialized, the more resistant it is. Both radium and X rays produce cellular death followed by fibrosis and their continued use causes the development of an adult type of cell which is highly resistant to their action. This is a distinct limitation of their use.

Certain types of sarcoma very rapidly diminish in size after radiation, and this point is of diagnostic value. However, metastasis is early and secondary growths are likely to appear. If these come in locations favorable for radiation treatment it may be possible to control the development of the disease for a considerable period. Indeed, a few apparent cures have been observed.

X rays alone are used, particularly in cases where the tumors are inaccessible, as in the abdominal viscera or mediastinum. They are more frequently employed in combination with surgery, radium, or the electrothermic methods.

Massive doses of X rays are no longer used at this hospital, as fractional dosage has been found more effective. The aim is to catch the malignant cells at the most vulnerable stage of their

life cycle, when they are dividing, and at the same time to avoid damage to the healthy surrounding tissue. Hence the frequent small doses of short-wave X rays over long periods are used. The rationale of the fractional dose method is contained in the following quotation from a report by Doctor Clark and Doctor Morgan.

"There is evidence, from the histologic study of certain cases of cancer, that the bodily tissues react against such an invasion in much the same way as they do against any foreign substance in their midst. In the treatment of malignant disease it would therefore appear to be more rational to attempt to utilize this normal body reaction than to confine ourselves to methods which, although they kill or remove the cancer cells, fail to utilize these latent body powers or, worse still, damage them more or less completely during the course of such treatments. Our observations have led us to believe that a radiation dose can be administered to just sufficient intensity to stimulate the normal tissues surrounding a cancer to cause an active leukocytic infiltration and the subsequent changes which have been noted in cases of a normal reaction of the tissue to invasion. We suggest the term 'physiologic dose' for this quantity of radiation. Our dose factors are 220 kilovolts, 4 milliamperes, 50 centimeters distance, large portals. The time is an average of 3 minutes twice daily for superficial lesions and 10 minutes once or twice daily for deep-seated lesions. Very soon after the beginning of these treatments nearly all the patients voluntarily remark on a feeling of well-being and a lessening of the pain if this has been a prominent symptom. This is followed by a shrinkage in the size of the tumor and a softening of its constituents. A section at this time will show a marked small round cell infiltration. Another section, taken a little later, will show, in addition, vacuolization of the cancer cells, loss of cell outline and staining powers, and beginning hyalinization. Clinically the several cases which we have been able to observe and which had previously received radiation therapy to the limit of skin tolerance without benefit, promptly showed a favorable response to the small doses. The danger of X-ray burns and of radiation sickness would seem to be entirely eliminated. In covering a given area it has seemed beneficial to use large portals of entry and cross-fire technic. In this manner all the surrounding lymphatics are covered.

"The trend in this hospital is toward fractional, frequently repeated doses of radium for the same fundamental reasons as are given for small X-ray doses."

Radium is used in the form of capsules, plaques, and needles, the latter containing 3, 8 $\frac{1}{3}$, and 10 milligrams each. The form in which radium is used depends on individual requirements. Ema-

nation in capillary tubes is no longer used in this hospital, both because the retained glass tubes are considered to act as irritants and also because the caustic and irritating beta rays are not excluded. There is consequently more sloughing and painful fibrosis following the use of emanation tubes than follows the proper use of radium in needles. Accurate dosage is essential, because the object is to secure retrogression of the growth without sloughing. When immediate devitalization of malignant tissue is desired, the electrothermic methods have preference over radium.

Because of the strong feeling in this hospital against the general use of bare radium emanation tubes, the following extract from a report by Doctor Clark and Doctor Morgan is included.

"From our experience with capillary tubes containing from 0.5 to 1.0 mg., we object to the use of emanation in this manner for the following reasons:

"(1) We know that one of the causes of cancer is prolonged irritation. It seems irrational, therefore, to scatter in the tissues 10, 20, or more minute, hard foreign bodies, particularly so in tissues where considerable movement occurs, such as those of the tongue and muscles of the neck.

"(2) Theoretically these tubes should be planted at equal distances in the tumor to produce an even radiation, but practically this is almost an impossibility. Several tubes will certainly be planted too close to one another, resulting in an overdose, while other parts of the tumor will receive insufficient treatment.

"(3) The glass walls of these tubes are not thick enough to filter out sufficient of the beta rays; hence there is frequently produced an intense local reaction, followed by sloughing, great pain, and heavy fibrosis, which so cuts off all circulation to the part as often to result in further necrosis.

"(4) When once the tubes are planted we lose all further control over them.

"(5) The prolonged action of the emanation in buried tubes appears to have a particularly devitalizing effect on bone.

"(6) In our experience pain is almost always a severe and persistent symptom.

"On the other hand, the advantages of using radium or emanation in metal alloy needles are—

"(1) The needles being in the tissues for a regulated time only and then withdrawn, no irritating foreign body remains.

"(2) With needles of different sizes and lengths it is not impossible or a very difficult matter to embed the emanation or element at comparatively equal distances throughout the tissues.

"(3) The hyperirritating beta radiations are filtered out and their undesirable effects therefore avoided.

"(4) The time factor is under perfect control.

"(5) Bone necrosis has been observed to be much less frequent with needles.

"(6) Pain is certainly much less than with buried glass tubes."

The advantages of fractional X-ray dosage and the disadvantages of radium emanation in bare glass tubes are highly controversial subjects upon which there is by no means general agreement. I have not the technical knowledge necessary to enable me to draw any conclusions, but Doctor Clark and Doctor Morgan have been basing their daily practice on their convictions for several months, with favorable results.

Many cases treated by radium also receive X-ray treatment from various angles. This combination is used in such locations as the breast, cervix, and adnexa, prostate and rectum, also for radiation before and after operating on malignant growths of the mouth and neighboring parts. Radium is considered the best agent for treating hemangiomas covering large areas or when it is desirable to avoid the formation of a raw surface, as about the mouth of a nursing baby. Otherwise they are readily destroyed by electrodesiccation. Capillary nevi (port-wine marks) are treated by the ultra-violet light with pressure.

ELECTROTHERMIC METHODS

These are described at greater length than the other methods, because they have been developed by Doctor Clark to a very high degree of practical value, and because they are not yet generally understood or appreciated as their value warrants. They are known as "electrodesiccation" and "electrocoagulation." These terms are descriptive of the effects produced in the tissues by high-frequency currents of various intensities. Desiccation is produced by utilizing a current of just sufficient intensity to desiccate or dehydrate the tissues. The effect is produced by a monopolar high-frequency current of the Oudin type, of high voltage and low amperage, conducted to the tissues by a pointed metal applicator. Coagulation is produced by a bipolar high-frequency current of the d'Arsonvan type, of comparatively low voltage and high amperage. The heat thus produced is more penetrating and intense than that used in desiccation, causing a coagulation of the cell protoplasm. It is used to destroy large lesions and even bone.

High-frequency currents are characterized by rapid oscillations whose frequency can be raised to several million per second. On account of this, none of the usual painful faradic effects on the muscles are produced, and the passage of the current into the tissues is manifested by the production of heat within the tissues, owing to their resistance to the current. The electrode remains cold. Machines of special construction, allowing a very accurate control of

the voltage and amperage, are necessary to secure a suitable current. A machine giving a satisfactory current for therapeutic use may be entirely unsuitable for surgical work.

Electrodesiccation causes a drying out of the cells without apparent degenerative changes. The heat generated in the tissues causes an evaporation of the fluid portion, and the protoplasm is condensed or mummified rather than disintegrated. This is important, because the amount of fibrous tissue produced in healing depends on the nature and quantity of cell degeneration and necrosis of the destroyed tissues. Therefore the tissue produced in healing after desiccation contains relatively little fibrous tissue, is soft, and has a good blood supply. Desiccation is of particular value where good cosmetic results are desired, and the tissues after healing are ideal for plastic work if this should be necessary.

Electrodesiccation is subject to such perfect control that small growths of the cornea or on the vocal cords can be successfully removed without any impairment of function of those delicate structures. It is also used for removing localized benign growths of the larynx, bladder, or rectum, as well as corneal ulcers, pterygium, trachoma, cervical erosions, moles, angiomas, leukoplakia, and lupus. Its most important use is in the removal of basal-cell epitheliomas of the face or elsewhere, which remain localized and have but little tendency to metastasize. The growth can be removed in a single treatment, and the resulting scar is soft, elastic, and of normal color. Should the growth recur, as rarely happens, desiccation can be repeated with the same chance of success as before the primary operation.

Electrocoagulation is a process in which a more intense heat is produced. There is, in addition to the drying effect, a coagulation of the protoplasm and increased trauma to the cell elements. Consequently more fibrous tissue is formed following its use than after desiccation. A bipolar current is used and the large, moist, indifferent electrode is applied to the buttocks or back. It is employed in the larger and more advanced growths, even those involving bone. By its use excellent results are obtained in treatment of advanced carcinoma of the nose, face, antrum, tongue, or any accessible region. I saw several cases of advanced growths which were treated by coagulation three to five years ago and have had no recurrence.

The chief advantages of the electrothermic methods are immediate destruction of the neoplastic cells in situ; penetration of the heat for a considerable depth into the tissues, assuring destruction of malignant cells in the neighborhood; elimination of hemorrhage, either primary or secondary; diminution of the liability to formation of metastasis, since the blood and lymph vessels are thrombosed

beyond the area of destruction; a minimum of dense scar tissue after healing.

Much confusion has been caused by the many different names applied to the electrothermic methods. High-frequency fulguration, surgical diathermy, endothermy, electroendothermy, and diathermic cauterization are a few of the terms that have been used to describe the current, its method of application, or its effect on the tissues. Until there is more general agreement on the nomenclature, it seems better to adhere to the terms which the originator has applied to these methods.

The exact technic is difficult to describe clearly; it must be learned by observation and experience. A meter can not accurately measure a monopolar current, so it is necessary to adjust the machine until the quality of spark is produced that experience has shown is best for the particular effect required. A handpiece with a contact switch is used. It holds an ordinary cambric needle, which is used for small lesions, or larger wires, which may be of any required length or shape. If a superficial destructive effect is desired, the point of the needle is held a short distance from the lesion. Just touching the surface gives moderate penetration, while inserting the needle into the tissue gives deeper penetration, the extent being controlled by the depth of insertion, the time of application, and the intensity of the current. It is customary first to make a ring of needle punctures around the lesion to control metastasis, then to treat the lesion itself. When the whole neoplastic mass has been thoroughly treated it is removed by curette, scalpel, or scissors and the exposed surface examined to determine whether or not any of the growth remains. If any is found, it is again treated and curetted until the operator is certain that no diseased tissue remains. In some small benign growths a better cosmetic effect is obtained by permitting the slough to separate itself without curettage or excision.

When the bipolar current is used for electrocoagulation the indifferent electrode is usually a large, moist asbestos pad applied to the patient's back. Close contact is necessary to avoid sparking and burning the skin. For pedunculated growths a wire snare may be used as the active electrode.

Whether desiccation or coagulation is used the object is to secure complete eradication of the growth by a single operation, but if parts are inaccessible this treatment may be followed by the insertion of radium needles, by X-ray therapy, or both. Bone which has been treated by electrocoagulation will sequestrate in about six weeks.

The after treatment consists of cleanliness and asepsis, secured by daily dressing. A solution of sodium hypochlorite is very useful

not only for its bactericidal action but also for its solvent action on necrotic tissue.

The radio knife, endotherm knife, or acusector is a different method of applying the high-frequency current for tissue destruction. It employs an undamped current of more rapid oscillation, lower voltage, and lower amperage. An indifferent electrode is used and the active electrode is bluntly pointed. It does not actually cut, but when the electrode is applied to the tissues the passage of the current causes molecular disintegration at its point. Clean incisions can be made without capillary bleeding, and they heal by first intention. It has been used for excising neoplasms and for other operations, such as herniotomy. Its field of usefulness is not yet definitely established.

Doctor Clark uses a Wappler "Excell" high-frequency machine, which has been specially designed by him to produce the quality of current suitable for this work. A machine of this type has been installed in the naval hospital, Washington, D. C., and we have used it for seven months. A large number of lesions, both benign and malignant, large and small, have been treated, and we have been able to duplicate Doctor Clark's results. The large number of service people over 50 years old, both active and retired, in this vicinity provides a large number of lesions suitable for treatment by this method.

TREATMENT OF SPECIAL LESIONS

The success achieved at this hospital appears to the observer to be very largely due to the fact that no one method of treatment is favored, all methods being used according to the requirements of the individual case. The following outline gives the treatments that have been found most effective:

Basal cell lesions of the face, ears, neck, and other accessible regions are best removed by electrodesiccation, generally under local anæsthesia. If large, electrocoagulation may be used, with general anæsthesia. When they involve mucous membrane or cartilage, one expects a higher degree of malignancy, and they may also require radiation.

Squamous, cuboidal, or prickle cell lesions of the face, lip, tongue, and neck have a greater tendency to involve the adjacent glands, so coagulation of the growth is followed by radiation. If the growth is extensive, a preliminary ligation of one or both external carotids may be necessary, or even ligation of the common carotid.

Conjunctival lesions, such as epithelioma, pterygium, and trachoma, are successfully treated by desiccation without injury to the cornea or adjacent structures. Corneal ulcers are also treated by this

method. In malignant disease of the orbit, where exenteration is indicated, the electrocoagulation method has been very satisfactory.

Papillomata, moles, plantar warts, xanthoma, lupus, ringworm, leukoplakia, and localized infections, such as anthrax lesions of the skin, are treated by desiccation.

Cancer of the lip is treated by desiccation combined with postoperative radiation of the lymphatic areas.

Cancer of the tongue requires radiation of the lymphatic areas, possibly ligation of one or both external carotids, then desiccation. More extensive lesions may require amputation by the coagulation method. Radium needles may be inserted into inaccessible or dangerous areas, and postoperative radiation of the lymphatic areas may be advisable. Advanced cases with much swelling of the tongue and fauces sometimes need preliminary tracheotomy or gastrostomy.

Nevi, if small and superficial, are treated by desiccation, and port-wine marks by the Kromayer mercury-vapor lamp. Since the ultraviolet rays will not penetrate the capillary blood layer in the skin, it is necessary to produce ischemia by pressure with a quartz lens while the treatment is being applied. The surrounding normal tissues are protected by adhesive plaster. Cavernous angiomas may require radium, and this agent is always used when it is desirable to avoid the formation of a raw surface, as on the lip of a nursing baby. Angiomas are also treated by desiccation or coagulation, depending on the location, size of the lesion, and the age of the patient.

Infected tonsils may be removed by desiccation in hemophiliacs or others when surgical removal is not advisable. Cancer of the tonsils is treated by insertion of radium needles, followed by X-ray therapy.

Cancer of the larynx requires preliminary tracheotomy. Ten days later the larynx is excised longitudinally and the growth removed by desiccation. Insertion of radium needles or postoperative X-ray treatment may also be necessary. In extreme cases a laryngectomy is done and followed by radiation treatment. When there is esophageal involvement, a preliminary gastrostomy is done.

Malignant growths of the lungs or mediastinum are treated by X-ray therapy only.

Cancer of the breast receives radiation treatment to the glandular areas and the lungs if there is metastasis. After radiation of the breast it is removed with scalpel or radio knife and radiation again applied. If ulceration is present, the breast may be removed by coagulation.

Malignant growths of the abdominal viscera are treated by short-wave X-ray therapy.

Cancer of the uterus involving the cervix and adnexa is treated by inserting radium needles into the cervix, radium capsules into the canal up to the fundus, and X-radiation into the pelvis. When the body of the uterus is involved, hysterectomy is performed and followed by postoperative radiation. Cervical erosions and urethral caruncles are treated by desiccation.

Cancer of the bladder, when very advanced, is treated by X-ray therapy alone. Localized benign or malignant growths may be treated by coagulation through a suprapubic incision or by the desiccation method through a cystoscope. When pedunculated, the growth may be removed by passing the current through a snare placed around its base and any remaining disease then treated by desiccation.

Cancer of the prostate is treated by radium needles and X rays.

Cancer of the rectum, when accessible and strictly localized, is treated by coagulation or desiccation followed by X-radiation. More advanced cases are treated by insertion of radium needles followed by X-ray treatment of the lymphatic glands of the pelvis and abdomen. In advanced cases a colostomy is done as a preliminary step. Hemorrhoids are very successfully treated by desiccation after clamping, as in the clamp and cautery method.

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Fig. 1a



Fig. 1b

Fig. 1a.—Nevus pigmentosus treated by the desiccation method. Fig. 1b shows the good cosmetic result obtained



Fig. 2a



Fig. 2b



Fig. 2c

Fig. 2a.—Basal cell epithelioma of the nose. Fig. 2b.—Result of one electrocoagulation treatment. Fig. 2c.—Artificial nose by the sculpture method



Fig. 3a



Fig. 3b

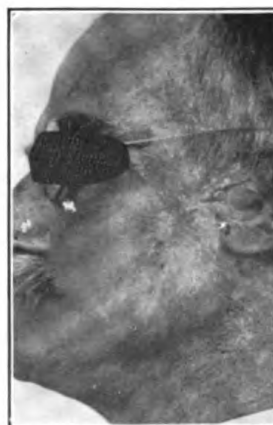


Fig. 3c

Fig. 3a.—Advanced basal cell epithelioma involving the cheek, parotid gland, and osseous structures. Had resisted many forms of treatment. Fig. 3b.—Result of one electrocoagulation operation. Fig. 3c.—After eight years. No recurrence. Patient in perfect health



Fig. 4a



Fig. 4b

Fig. 4a.—Very advanced basal cell epithelioma involving the tissues of the face, nose, septum, antrum, malar bone, whole orbit, ethmoid, frontal sinuses, and inner canthus of the left eye. Fig. 4b.—Result of one electrocoagulation operation



Fig. 5a

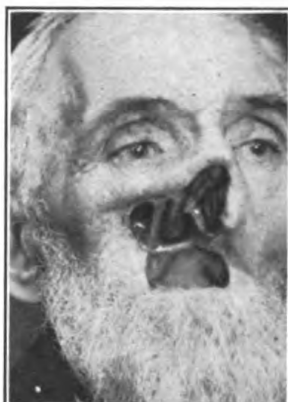


Fig. 5b



Fig. 5c

Fig. 5a.—Basal cell epithelioma involving upper lip, antrum, septum, nose, alveolus, and hard palate. Three years' duration. Fig. 5b.—Result of one electrocoagulation treatment. No recurrence in eight years. Fig. 5c.—Features reconstructed by the sculpture method



Fig. 6a



Fig. 6b

Fig. 6a.—Large round cell sarcoma involving face, antrum, malar bone, floor of orbit, and ethmoid, as well as all the tissues within the orbit. Fig. 6b.—Result of one coagulation treatment. (In our opinion, this is the type of lesion in which the coagulation method stands supreme)



Fig. 7a

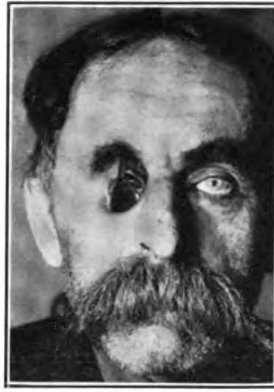


Fig. 7b



Fig. 7c

Fig. 7a.—Melanotic sarcoma involving the orbit, antrum, ethmoidal and frontal sinuses.
Fig. 7b.—Result of one electrocoagulation treatment. No recurrence in one year.
Fig. 7c.—Artificial eye and brow by the sculpture method



Fig. 8a



Fig. 8b

Fig. 8a.—Mixed cell sarcoma, springing from the ethmoid, filling the orbit and causing great bulging of the eyeball. Fig. 8b.—Result of combined electrocoagulation and radium treatment. No recurrence in four years



Fig. 9a



Fig. 9b

Fig. 9a.—Small round cell sarcoma of bulbar conjunctiva and cornea. Fig. 9b.—Result of one desiccation treatment under local anesthesia. There is no perceptible scar and no impairment of vision. No recurrence in nine years

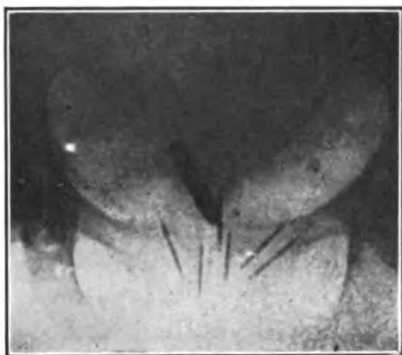


Fig. 10.—Showing method of treating carcinoma of the uterine cervix by radium. Needles around cervix with radium capsule in canal

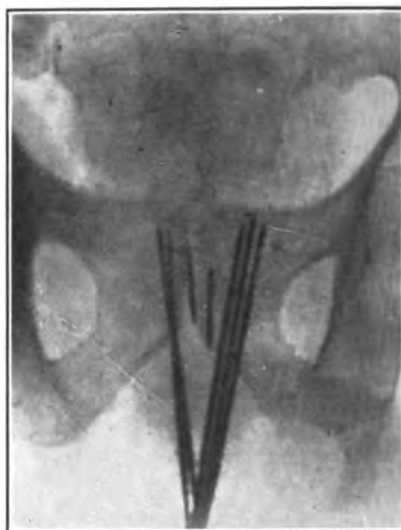


Fig. 11.—Radiograph of radium needles inserted through the perineum into a malignant prostate

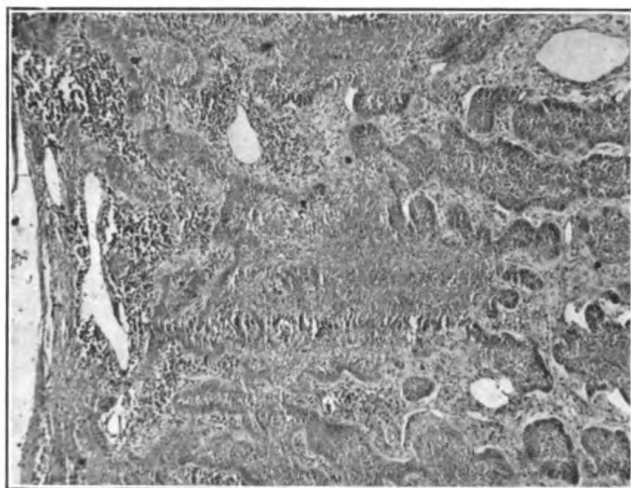


Fig. 12.—Section of basal cell epithelioma removed before the application of the desiccation current, showing bulky masses of infiltrating basal cells

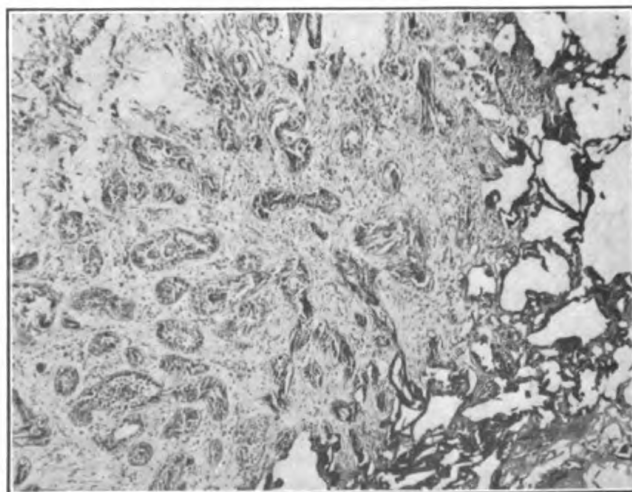


Fig. 13.—Section from the same growth as Figure 12 showing the effect of the desiccation treatment. The cellular masses are definitely shrunken, the individual cells shriveled, and the nuclei condensed and elongated

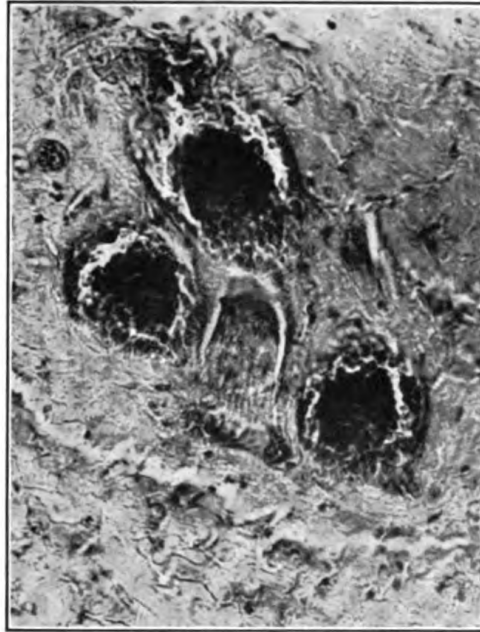


Fig. 14.—Squamous cell epithelioma treated by the coagulation method, showing an extensive area resembling hyalinization and several thrombosed vessels. The tumor cells seem to have fused into a structureless mass

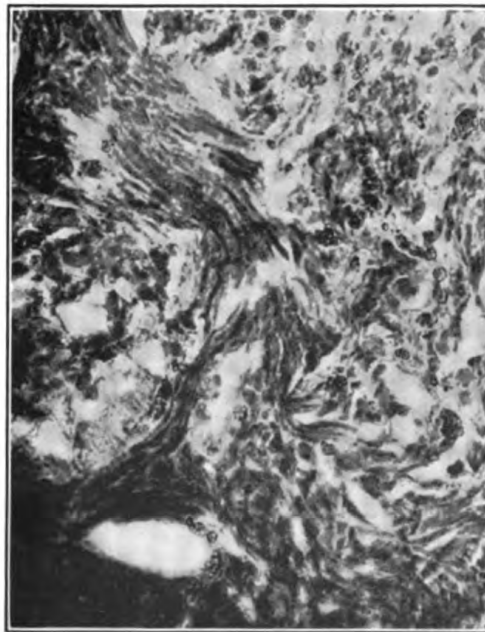


Fig. 15.—Basal cell epithelioma of the cheek, treated with electro-desiccation. The devitalized cells appear as long, slender threads—"mummification necrosis"

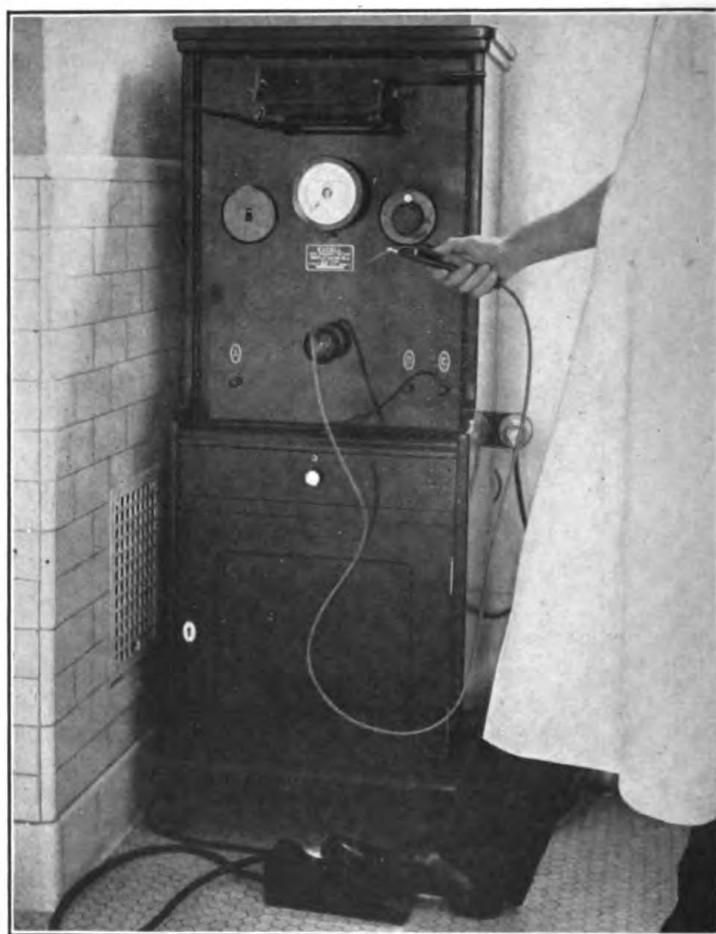


Fig. 16.—High-frequency machine at Naval Hospital, Washington, D. C.
Note foot switch and hand piece rigged for desiccation

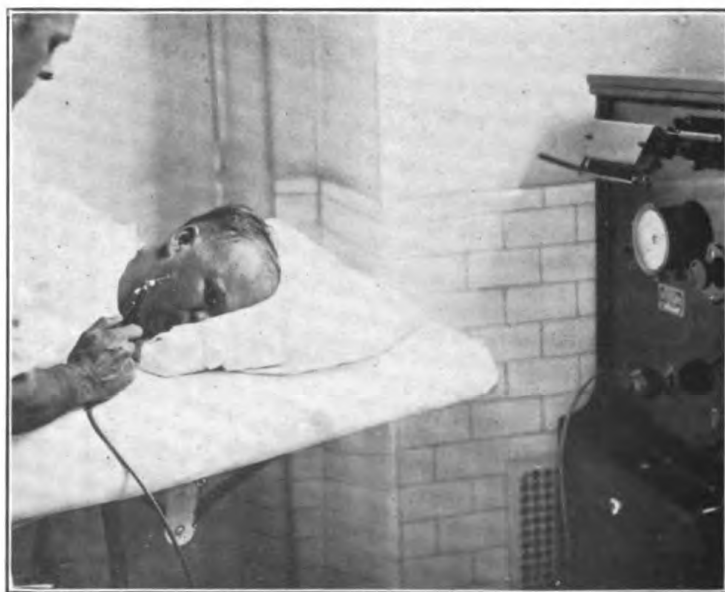


Fig. 17.—Method of employing electro-desiccation for destruction of
small lesions. Naval Hospital, Washington, D. C.



FIG. 18.—Carcinoma of cuboidal-cell type treated at Naval Hospital, Washington. Post-operative treatment. Radiated treatment.



FIG. 19.—Same patient after treatment by electrocoagulation. Tissue healed and healthy. Scarification of orbital plate of frontal

CLINICAL NOTES

YEAST-CELL INFECTION IN MAN—REPORT OF CASE

By J. E. MILLER, Lieutenant, Medical Corps, United States Navy

The study of yeast-fungi infection in mankind dates back to 1894, when Gilchrist reported a case of blastomycetic dermatitis in man. During the same year Burschke and Busse, in Germany, reported a case of saccharomycetic septicemia. Blastomycetic dermatitis is a very rare disease, and most cases have occurred in Chicago, Ill. The infection being so largely confined to this city has caused it to be often spoken of as the "Chicago disease," but it has been noted abroad, and is termed saccharomyces or coccidiodes dermatitis by continental writers. Yeast-mold infections of mankind are rare, and usually occur as skin affections. In rare instances it does not remain localized to the skin but gains entrance into the body and produces tubercle formation, tissue destruction, and abscess formation in the lungs, spleen, kidneys, and, in very rare instances, it may be found involving the meninges and brain.

The exciting cause of the infection is recognized as being some type of the yeast fungi, but little is known in regards to the predisposing factors in the production of the infection. Slight traumas of the skin, as scratches, abrasions, and ulcerations, no doubt act as predisposing factors, in that the mold gains entrance by such wounds, setting up infection in the susceptible individual. This seems best to explain the manner in which skin blastomycosis occurs. It is not definitely known how the systemic infection is brought about. The fungi may be absorbed into the lymphatic streams after the skin is invaded, and secondary infection may occur in distant organs by such a method of transportation, while the pulmonary type of the infection may occur from inhalation of dust containing the mold. The disease affects all ages, but is found most often after middle life. Blastomycosis is practically confined to Illinois and found in and about Chicago. Coccidiodes occur principally in California, and the same is true of torulosis. It is remarkable that yeast-cell infection is so rare when one considers the geographical distribution of the fungi as found so plentiful in nature, and it is fair to assume that man must possess a remarkable degree of immunity to the infection.

If the infection remains localized to the skin, as it does in most cases of blastomycosis, it runs a chronic and benign course with very little impairment of the patient's general health. It is in the systemic type of infection that the patient's general health is markedly impaired, and death occurs in nearly 95 per cent of generalized infections. When the central nervous system is involved, the most malignant manifestations of the diseases are witnessed, and death occurs in 100 per cent of such infections.

Among the yeast fungi that produce granulomata upon the skin or in special organs are the tame and wild yeast molds. Blastomycetes and coccidiodes are considered as tame yeast molds and torulæ as wild yeast mold. Blastomycetes usually remain localized to the skin and rarely causes a systemic infection. Coccidiodes may affect the skin but tends to early systemic infection, which ends fatally in most cases. Torulæ has a special predilection for the central nervous system without the involvement of other organs and all reported cases have terminated fatally.

Many writers have considered all three types of yeast mold as identical, but careful cultural study will reveal the fact that the three types spoken of above are distinct and individual species. The blastomycetes reproduce by budding, ferment sugar, and form mycelia upon culture. The coccidiodes reproduce by sporulation and, like the blastomycetes, form mycelia upon culture. Torulæ reproduce by budding as do the blastomycetes, but do not ferment sugar nor form mycelia upon culture.

A glance at the review of the literature will reveal the rarity of yeast-mold infection of the central nervous system. No cases of blastomycetes or coccidiodes infection primarily involving the nervous system are authentically reported, and only 12 cases of torulosis appear in medical literature. Torulosis is a very rare infection with the torulæ or wild-yeast fungi, and the first case was reported by Stoddard and Cutler of the Rockefeller Institution in 1916. They reported two cases mistaken for tubercular meningitis during life, but recognized post-mortem by the formation of tubercles containing the torulæ. They reported four other cases from the literature, and in 1917 Pierson, of San Francisco, reported the seventh case. In 1922 Newton Evans, of Loma Linda, Calif., reported two additional cases, and in 1924 Mona E. Bettin, of Los Angeles, reported the tenth case as occurring in the United States. Seven of the reported cases occurring in the United States of America are reported as occurring in California, in the San Joaquin Valley and about the city of Los Angeles. Two additional cases are recorded as occurring in Europe, bringing the total number of torulæ infections to 12 cases.

Torulosis is rarely recognized during life and is usually mistaken for nonsuppurative or tubercular meningitis, senile dementia, chronic alcoholism with psychosis, or brain tumor. It is usually at the autopsy table or in the laboratory that the disease is correctly diagnosed.

The pathology of the infection is that of a chronic meningoencephalitis plus the formation of tubercles scattered throughout the brain tissue. The tumors may vary in size and, on microscopic examination, reveal the presence of the yeast cells. There is an associated sclerosis of the brain tissue and the meninges are thickened and adherent. The spinal fluid is slightly increased in amount and contains the yeast-like cells in varying numbers.

The onset of the disease is insidious, and the disease runs a fatal course in from three to six months. The symptoms are essentially those of a chronic nonsuppurative meningitis. The spinal fluid in the early stages of the disease is clear and rarely under increased tension and the yeast cells may be found in small numbers. As the disease progresses, the spinal fluid may be slightly or moderately increased in amount and reveals the yeast cells in great numbers, varying between 100 to 2,600 per cubic millimeter of spinal fluid. There may be an increase of mononuclears and a positive globulin reaction with a variable Lange colloidal gold test.

The first symptoms noted is severe and constant headache. As the disease progresses, the headache becomes more severe and extends intermittently throughout the course of the disease. If the progressive headache be associated with nausea and vomiting, which is often the case, the symptom-complex of headache, nausea, and vomiting may simulate brain tumor, and the case is likely to be incorrectly diagnosed as such. If dimness of vision and paling of the optic disk be present, and the spinal fluid moderately increased, and an examination of the spinal fluid is not made for the yeast cells, the diagnosis is certain to stand as brain tumor.

Headache is a constant feature in all cases. In the latter stages nausea and vomiting may disappear, or these two symptoms may never occur throughout the course of the disease. After a few weeks of severe headache there will be noted a decided change in the patient's personality. The change of personality is readily noted by members of the patient's family. He becomes nervous and irritable, and headache and irritability increase as the disease advances. He gradually becomes mentally dull and suffers from mental confusion.

During the stage of mental irritability the superficial and deep reflexes are usually moderately increased; there is a moderate Babinski present and slight rigidity of the muscles of the neck. After the

stage of irritability passes, drowsiness, with mental confusion, increases, and the patient may be completely disoriented for time, place, or date. During his wakeful hours he wanders about aimlessly, and in the disoriented state the case may be mistaken for one of Korsakoff's syndrome or alcoholic psychosis. This is especially so if there be an associated multiple neuritis with pain up and down the arms and legs and tenderness of the nerves is found on pressure and there is a definite history of alcoholism.

Beginning with the headache and nervous symptoms there is a steady and progressive loss of weight and strength, leading finally to a state of weakness and emaciation which may be very marked. The patient becomes bedridden from weakness and emaciation, but no paralysis is noted. The temperature usually remains normal throughout, but may be slightly elevated, 99° to 100° in some cases. The fever is intermittent in type, and in one case it was reported to have been 104° F. The leukocytes usually remain normal but may be slightly increased, and the increase will depend on the amount of fever present.

The diagnosis of torulosis of the nervous system can only be made by routine lumbar puncture and examining the spinal fluid for the presence of the yeast cells. The presence of yeast cells is pathognomonic and differentiates the infection from the various types of nonsuppurative meningitis, brain tumor, Medin's type of anterior poliomyelitis, and senile dementia. Extreme care must be taken that the yeast cells are not mistaken for lymphocytes, which is usually the case. If doubt exists as to the type of cells found in the spinal fluid, some fluid may be placed on culture media and the yeast cells may be cultured for 48 hours. Culture of all spinal fluid in patients showing signs and symptoms of a meningoencephalitis should be a routine procedure if we are to recognize this disease during life.

The prognosis of yeast-cell infection of the central nervous system is best expressed by the fact that 12 authentic cases have terminated fatally after running a progressive course over a period of from four to six months. Treatment is purely symptomatic, and the patient must be relieved of pain by appropriate methods.

The writer wishes to present a case that he considers a case of torulosis of the nervous system. The case history follows:

The patient, a male, was admitted to the naval hospital, San Diego, Calif., under the diagnosis of senile dementia. Upon admission the temperature, pulse, and respiration were normal, but after a few days the temperature became slightly elevated, 99° to 100° F., and intermittent in character and continued thus throughout the course of the infection. The patient walked from the street car, a distance of about two blocks, to the officer of the day's office and to medical ward 2 unassisted, and no ataxia or paresis was noted in his gait, which was normal for a very feeble man. The patient was 54

years old and had had many occupations, to be enumerated in the history later. He was retired from the United States Army in 1898 for chronic lung abscess, and was a pensioner until the date of his death. He developed lung abscess while serving with the Army in the Philippine Islands and was surveyed from the service during the above year.

The chief complaints upon admission were prolonged weakness, marked loss of weight, excruciating headache prior to admission, and pain in arms and legs that dated back for a period of five or six weeks, although he had been failing in health for the last two or three months. The patient stated that the symptoms were not constant, but more or less intermittent in character, with periods of complete relief between the attacks. Headache has not been associated with nausea or vomiting, and both these symptoms are entirely absent from the symptomatology of the patient's present trouble or illness.

The attacks of painful headaches are associated with attacks of pain in arms and legs. They are of a sharp character and come and go rapidly, with dull headache and dull aching pain in arms and legs between the attacks of sharp pain. The headache upon admission is the same in character that had existed prior to entrance to the hospital. Vision appeared to be fair with the use of glasses that had been worn by the patient for years, and no dimness of vision had been noted by the patient. He has suffered from no attacks of vertigo or diplopia, but has suffered from attacks of fullness in the head for the last six months when not having an actual headache. He has had a chronic cough since his discharge from the Army in 1898, and on repeated occasions has expectorated large amounts of pus or yellowish sputum which often contained what he called clotted blood. He complained of toothache, which had been a common occurrence during the last few years, and had been advised by a civilian dentist that all teeth should be removed for far-advanced and incurable pyorrhea. Such a procedure had never been carried out.

Personal history.—The patient uses tobacco in moderation. He states that he has always been a moderate user of alcohol, but his wife says that the patient during the last six months has been drinking home-made "moonshine" excessively and she believes this drinking to be the cause of his present illness in so much as the symptoms from which the patient suffers started at about the time he began to drink heavily. He has been intoxicated on many occasions during the last six months, and the symptoms have been markedly aggravated following each drinking bout. The wife states that during this drinking period the patient developed a state of fear and that he was afraid to go out on the street alone because of fear that some accident might befall him or that he might become lost.

The patient prior to admission to the hospital had held the position of night watchman for the San Diego Gas & Electric Co. for a period of two years, but he had recently given up this position on account of his present complaints. He has been married for 21 years. No children have been born, and his wife is in excellent health and has never suffered miscarriage or abortion. After discharge from the Army the patient studied the jeweler's trade and worked at same for two years, when he gave the work up as too confining. In 1900 he sought and obtained employment with a packing company in San Diego, Calif. He was employed as a killer of cattle, sheep, and hogs and assisted in dressing meat for a period of three years, during which time he suffered from repeated attacks of cough and expectoration of large amounts of pus or yellowish matter. During this time it was noted that slight cuts or abrasions on the hands as encountered during killing and dressing of animals became readily infected. The area so traumatized sup-

purated along the line of injury and was surrounded with an area of red and purple inflammation that required constant dressing and weeks for cure.

After a period of three years of employment at the packing house the general health of the patient became so impaired that he gave up work and sought rest on a vacation trip in the mountains near San Diego. After rest for three months, while leading an outdoor life, the patient's general health improved to such an extent that he went to Imperial Valley, Calif., and raised cotton for a period of 15 years. During this period pulmonary symptoms continued, but the patient made the best of things until, at the end of 15 years' work in the valley, when cough, expectoration, weakness, and loss of weight made the patient an invalid, and he returned to San Diego in 1918. Broken in health, the patient lived off of the income made from farming and from his retired pay received from the Government until 1922, when he obtained employment with the gas company. He worked until the summer of 1924, when he started to drink heavily, with forgetfulness as the first symptom of his recent illness.

As time passed he found difficulty in carrying out his duties and, five weeks prior to admission, he gave up the position of night watchman, as he was afraid to be alone and to go to and from work unprotected. The wife and neighbors noted a decided change in his personality. He became dull, irritable, and mentally confused. Weakness and emaciation were progressing hand in hand with the patient's mental deterioration.

The *family history* reveals the fact that his father died of Bright's disease at age of 72 and that his mother died of gastric carcinoma at the age of 52. Four brothers are living, all well, and the family history is negative for tuberculosis, epilepsy, and insanity. The patient's medical history reveals that he had mumps and gonorrhea at the age of 21, and that he contracted gonorrhea again at the age of 33. He contracted syphilis at the age of 40 and had another chancre at the age of 51. He has had no injuries nor has he undergone any surgical operations. Bowels are regular, but appetite has been poor for some time. Has never vomited nor has he ever been nauseated.

Physical examination.—The patient is greatly emaciated and is lying quietly in bed and apparently suffering no pain. Hair, black, with a few gray hairs present. Skin of face reveals marked capillary dilatation and broken capillaries. Head shows no tumors, masses, scars, or depressions. The pupils are regular, equal, but slightly contracted, and the pupillary reaction to light is more sluggish than is normally found. The patient has been given morphine prior to admission to the hospital. No nystagmus, diplopia, or paralysis of the eye muscles noted. There is slight impairment of hearing on the left side, as ascertained by watch examination, but right ear is normal. The teeth are in a state of far-advanced pyorrhea, and pus can be expressed from the socket of each tooth. The thyroid gland is normal, and likewise the body lymph glands. The chest is flat, and many subcrepitant râles are heard throughout the lungs. There is impaired resonance throughout the chest, with a hyperresonant note over the right lower lobe. The heart is rapid and irregular, but appears normal in size, shape, and position, and no murmurs are heard. The abdomen is scaphoid and emaciated. Genitalia are normal and likewise the prostatic gland. The knee reflexes are slightly hyperactive. No Kernig or Babinski or clonus present. Romberg sign is negative. There is moderate, rather coarse tremor of hand, and the patient's handwriting is not so good as a few months ago, as revealed by comparison.

The patient was ordered to absolute rest in bed and given eliminative and tonic treatment. He was admitted on January 14, 1925.

January 29, 1925.—Since date of admission the patient has been in a state of mental confusion. The temperature is irregular and varies between 99°

and 100° F. Restlessness and irritability are marked, but he complains of no pain. He walks about the ward in a normal manner, but has a tendency to wander away from the ward and has difficulty in finding his bed. Restlessness is completely controlled by veronal and hot milk given for insomnia. He complains of no headache. One tooth extracted and no toxic reaction noted. Tonic and supportive treatment continued. Laboratory findings since admission reveal that the red-blood count is normal and the leukocytes are 10,000. Blood Wassermann reaction negative; urine normal. Blood urea, 42 m. g. per 100 c. c.; creatinine, 2.3 m. g. per 100 c. c. X-ray examination of chest reveals congestion throughout the lungs, with collapse of a portion of the right lower lobe, with associated pleurisy, with possible slight amount of fluid.

The chest was aspirated in three locations and no fluid found. One week later no change in symptoms noted other than progressive weakness and emaciation. The patient states that he is in no pain, but he is restless and is hard to keep in bed. He has a tendency to get out of bed when not watched, and wanders about stair steps and is a menace to himself. Lumbar puncture performed and 10 c. c. of clear fluid removed and no increase of tension noted. The spiral Wassermann reaction was negative; globulin test slightly positive; 600 lymphocytes present, and likewise a positive tabetic gold curve noted. The report of 600 lymphocytes is very high for nonsuppurative meningoencephalitis, with the exception of poliomyelitis, and it is possible that the yeast cells were mistaken for lymphocytes.

January 31, 1925.—No change noted following lumbar puncture. Two teeth extracted without reaction.

February 2, 1925.—The patient is growing progressively weaker. Up to one week ago he could walk about, but at the present date weakness is so marked that he collapses if not supported. Diagnosis changes from senile dementia to nonsuppurative meningitis.

From February 2, 1925, emaciation and weakness progressed, and the patient died on February 13, 1925, from profound asthenia. He was conscious up to the time of death and had never been in coma. Toward the end constant delirium was present.

Autopsy revealed bilateral obliterative pleurisy and partial collapse of lower right lung. A few hard nodules were present in both apices. All other organs were normal, with the exception of the brain, which revealed the presence of seven small brownish and rounded tumors. The membranes were thickened and adherent. Moderate sclerosis of both hemispheres was present. One small, pea-sized tumor was found on lateral wall of right ventricle and extending into ventricular cavity. Another slightly larger tumor was found external to the wall of the ventricle, and five small tumors were found scattered throughout the cerebellum. Histopathological examination made by the United States Naval Medical School, Washington, D. C., is as follows: Diagnosis—Infectious granuloma, cystic blastomycosis. Section of cerebrum and cerebellum show numerous irregular cysts filled with yeast cells, character of cryptococci. No evidence of malignant tumor formation.

The patient while in the hospital had no cough nor expectoration; consequently no sputum was available for examination for blastomycetes.

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PROVOCATIVE REACTIONS IN PRIMARY SYPHILIS

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The phenomenon occurring when a positive complement fixation reaction appears on a previously negative blood after the administration of salvarsan was first noticed and described by Gennerich (1) in 1910. It was also described by three others at about the same time—Milian (2), Herxheimer (3), and Michaelis (4). However, its exact mode of production is as little understood now as it was when first described.

Gennerich wrote of the reaction as often occurring in treated cases and in those with a history of a primary sore, but with no further development of symptoms of syphilis after disappearance of the initial lesion. Many studies have been made to determine the time when a positive blood reaction becomes negative after the administration of salvarsan, notably those of Noguchi (5), Craig (6), and Nichols (7), but most of the studies made on the provocative feature of the reaction have had to do with latent or treated cases.

Several methods of making the test have been suggested, and it is thought that one similar to the procedure recommended by Craig (8) is reliable. He advises the administration of from 0.3 to 0.6 gram of salvarsan, intravenously,¹ and the collection of blood specimens in 12 hours after administration of the drug, 24 hours after administration, and every day for 10 days, if necessary. He also advises testing the blood again on the twelfth to fourteenth day, if negative up to that time, to pick up any delayed reaction.

Practically all of the literature on the subject of provocative reactions deals with the Wassermann test, or as more generally referred to at this time, the complement fixation test for syphilis. Most studies with the *provocative* Wassermann have been made on treated or latent cases, probably for the reason that reactions of a positive nature were not expected to be present in a majority of early cases, and in the secondary stage they are so constantly positive as to render provocative procedure unnecessary.

Buchanan (9), in reporting 15,000 routine tests in three consecutive series of 5,000 tests each, gives the following per cent of positives before and after treatment:

Series	Number	Before treatment	After treatment
1.....	5,000	<i>Per cent</i> 34.2	<i>Per cent</i> 54.2
2.....	5,000	29.7	46.2
3.....	5,000	27.6	55.6
Total and average.....	15,000	30.5	52.0

¹ The writer has found the same amount of neosalvarsan to be as efficient in producing the provocative reaction.

He thinks that the high percentage of positives after treatment can be attributed largely to an accumulation of tertiary, congenital, and neurosyphilitics in the population who have become "Wassermann fast." He does not give figures as to average time after infection before treatment was instituted, so that no deductions can be made regarding the provocative effect of treatment. We do know that many cases of syphilis will give a weakly positive or negative reaction and after an injection of salvarsan will show a marked positive on the following day, though it may be negative again on the third day. We also know that there may be a marked daily variation in a strongly positive serum; that if it is taken several times during the same day there may be a decided difference in the strength of the reaction in the different samples. This is best shown by titrating the blood in various amounts by the Kolmer method (10), with which serum from the same individual at different periods may run the entire scale between negative and strongly positive reactions.

Case 1 is given as an illustration of the provocative action of neosalvarsan on the blood and the apparent provocative effect on the dark-field findings. This case is interesting because of the extensive involvement without a positive dark-field or blood Wassermann, although the chancre-serum Wassermann was strongly positive; the short time before the appearance of the secondary rash, which developed on the second day after the drug; and the large numbers of treponemata found on the day following the use of neosalvarsan.

Case 1.—D. P. Blood Wassermann negative. Dark-field negative after an exhaustive search. Four hours later he received 0.30 gram of neosalvarsan intravenously, and was reexamined in 18 hours. At this latter time the serum from the chancre contained great numbers of treponemata, averaging several to each field of the microscope. This patient claimed but one exposure in the previous two months. Following this exposure, on the fifteenth day he developed an inguinal adenitis. On the twenty-ninth day after exposure a huge swelling of the glands appeared, with large quantities of clear serum exuding from beneath the prepuce. This serum seemed to come from the urethra, but no induration could be demonstrated because of the swelling. On first examination the serum contained no treponemata that could be found, even after several hours' search. The first examination was at 9 a. m. At 1 p. m. on the same day he received 0.30 gram of neosalvarsan, and several more dark-field examinations were made the same afternoon, with uniformly negative results. The following morning, 18 hours after the drug, he was again examined, with the result that treponemata were found in every field of the dark-field preparation. Two days later a typical macular secondary eruption appeared. The blood Wassermann on the day following the neosalvarsan was strongly positive.

Nichols (11) studied the time necessary to cause the death of the treponemata in experimental animal chancres, and found that

the average time was about 24 hours. In this study it was found that the best time to examine after injection of the neosalvarsan was about 18 hours following and that in 24 hours no live organisms could be found.

I could find but one reference in the literature to the provocative effect of salvarsan or neosalvarsan administration in small doses on early primary cases having a negative dark-field and complement fixation, but with clinical chancres—that of Pease (12)—who found in eight cases of primary syphilis giving a doubtful or negative reaction that all were definitely positive following the administration of salvarsan. He does not mention a secondary dark-field examination.

It is generally agreed that we should not place too much confidence in the clinical findings for the diagnosis of primary syphilis, for we know that the Hunterian chancre is found in only a part of the initial lesions seen. It is also controversial as to whether we should wait for the appearance of *Treponema pallidum* in the chancre serum or for a positive complement fixation reaction, which may mean a delay of several days to several weeks before instituting treatment. We are taught that the earlier the treatment is begun the more rapid the cure and smaller the chance for latent symptoms in the future. Many cases are on record where an absolute cure, so far as can be determined by known laboratory tests, has been effected by a single injection of salvarsan, though this is not usually the case. However, this point has been further strengthened in some cases by the patient acquiring a second infection, with a typical chancre and subsequent secondary manifestations. Knowing these facts, any procedure which will materially shorten the time before a diagnosis is made, thus facilitating early treatment, is thought to be justified by the result obtained toward a cure.

The writer has noticed that very often a provocative reaction occurs in early primary syphilis before the appearance of a positive complement fixation reaction, and that in those cases with a negative dark field very often the treponemata are found with ease in 12 to 18 hours after the administration of salvarsan or neosalvarsan. To determine the incidence of such an occurrence, a study was made on several cases of early and late primary syphilis, with the results as shown in Table 1.

TABLE 1.—*Results of laboratory examination before and after administration of neosalvarsan*

Case	Days duration of chancre	Location of lesion	Before neosalvarsan			After neosalvarsan ¹		
			Dark field	Blood, Wassermann	Chancre serum, Wassermann	Dark field	Blood, Wassermann	Chancre serum, Wassermann
(1) D. P.	14	Urethra.....			++	+	++	++
(2) E. M.	25	Corona.....	+	++	++	+	++	++
(3) H. H.	7	do.....			++	+	++	++
(4) H. B.	60	Prepuce.....	+	++	++	+	++	++
(5) O. C.	7	Corona.....		+	++	+		++
(6) R. C.	21	Prepuce.....	+	++		+	++	++
(7) C. C.	30	Lip.....	+		++	+	++	++
(8) G.	21	Corona.....	+		++	+	+	++
Per cent positives.....			62.5	50	87.5	100	87.5	100

¹ Provocative treatment: Each patient received from 0.15 to 0.30 gram neosalvarsan intravenously at 1 p. m. and tests repeated again at 9 a. m. on the following morning.

++ is taken as representing complete inhibition.

Percentages are given in Table 2. It was thought that inasmuch as the administration of neosalvarsan affected the complement-fixing property of the blood serum it might have some effect on the chancre-serum dark-field result and specific fixation reaction. To study this point these latter procedures were carried out in parallel on the patients, both before and after the administration of neosalvarsan.

It is still a matter of speculation as to the exact cause of the provocative Wassermann, two principal theories being advanced—first, that the injection of the arsenic preparation stimulates the multiplication of the organisms with consequent increased production of complement-fixing substance; second, that great numbers of the organisms are killed and that this releases into the circulation some substance which either fixes the complement or stimulates the increased production of antibodies. It was with the first theory in mind that this study was begun, as the increase of treponemata in the chancre serum after the drug and the almost constant results obtained with the chancre-serum Wassermann suggested the possibility of these two findings having something in common.

The results obtained with complement fixation on the serum from chancres by Klauder and Kolmer (13) and by Stern and Rypins (14) would seem to indicate that the serum from a true chancre is almost always positive, even after some local treatment.

It is an accepted fact that the provocative Wassermann is of value in latent secondary and tertiary syphilis, whether treated or not, Stokes's and O'Leary's series showing from 10 to 20 per cent more positives by its use (15). However, it would seem to be true that it could be used more often in early syphilis with benefit to the patient. We know that it is the exception for a positive-comple-

ment fixation reaction to be present in the first week after appearance of the chancre and that it is not commonly present in the second or third week, the highest percentage of positive reactions being found at about the time of the appearance of the secondary lesions. This is often six to eight weeks or more after the appearance of the initial sore.

Klauder (16), in a study of 115 cases of primary syphilis, found the dark-field examination to be positive in 93.9 per cent and the blood Wassermann positive in 36 per cent of the total cases during the first 10 days of the disease after the appearance of the initial sore.

Many cases of primary syphilis are seen which are of too short duration for a positive complement fixation reaction and in which the dark-field findings are negative, even after a thorough search. In this class of cases it is questionable whether it is to the best interests of the patient to wait for positive dark-field findings or Wassermann. This is especially so if a suspicious sore exists with induration, lack of pain, adenopathy, and other cardinal symptoms of chancre. It seems that it would be better preventive medicine to explain to the patient the benefits to be derived from early treatment, with a view to instituting measures to combat the disease as early as possible, and to keep the amount of systemic involvement at the lowest possible point. This we can do by giving a small amount of neosalvarsan immediately, at the same time taking advantage of any provocative effect by examining the blood and dark-field preparations again in 12 to 18 hours after the drug. If they are still negative, no harm has been done, and if the chancre begins to clear up while waiting for positive blood findings this in itself is a good therapeutic test. The percentage is in favor of our finding a positive chancre-serum Wassermann, which is enough evidence of syphilitic infection to warrant the administration of salvarsan, or neosalvarsan.

The argument of some syphilologists that the spirocheticide should not be given until the patient has developed secondaries and consequent resistance to the infection does not appeal to me after watching the result of many badly treated and untreated syphilitics.

TABLE 2.—*Number and per cent of positive and negative reactions before and after administration of neosalvarsan*

	Before administration		After administration	
	Positive	Negative	Positive	Negative
Blood Wassermann.....	4	4	7	1
Chancre serum.....	7	1	8	0
Dark field.....	5	3	8	0
Total number.....	16	8	23	1
Per cent.....	66.6	33.4	95.83	4.17

In the series studied all the tests were run in parallel as shown in Table 1. Table 2 gives the aggregate total number of both positive and negative reactions and the total per cent of each before and after neosalvarsan. It is thought that, while the number of cases is small, the results are interesting enough to report.

Each case was examined by dark-field, chancre-serum Wassermann, and blood was taken for complement fixation to be done on the following day. The latter was preserved in the icebox until the provocative blood was obtained on the following morning, when both were examined at the same time. As soon as the preliminary examinations were completed, the patients received from 0.15 to 0.30 gram of neosalvarsan intravenously, and all tests were repeated in 12 to 18 hours.

The technic for complement fixation used was the antihuman method of Noguchi with water-bath fixation (17).

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HOOKWORM DISEASE IN NAVY RECRUITS—ITS DIAGNOSIS AND TREATMENT

By OTIS WILDMAN, Lieutenant, Medical Corps, United States Navy, and N. S. BETTS, Lieutenant, Medical Corps, United States Navy

It has been the policy at the naval training station, Hampton Roads, Va., since the year 1918 to examine all incoming recruits from Southern States for intestinal parasites and to treat those found infected. Records of the results of 15,929 examinations are avail-

able, as are also the results of 671 carbon tetrachloride treatments for hookworm infection.

For the benefit of medical officers who may have occasion to make the laboratory examinations for uncinariasis on large numbers of men and to institute treatment we shall describe somewhat in detail the procedures employed and the results obtained at this station.

As soon as practicable after a platoon of 54 recruits is formed the men are assembled in the recreation building of the detention unit. Here the purpose of the examination is explained and the names of the following Southern States are called: Florida, Alabama, North Carolina, South Carolina, Georgia, Mississippi, Louisiana, Kentucky, Virginia, Tennessee, West Virginia, Oklahoma, Texas, Missouri, Maryland, Arkansas, Arizona, New Mexico, District of Columbia.

Men who came from or who have lived any part of their lives in these States are ordered to remain, and the others are dismissed. Our experience has shown that hookworm infection in men from Northern States occurs so infrequently except in mining districts that routine examinations are no longer considered necessary. It is known that freezing and extreme dryness kill the larvæ of hookworm.

The men to be tested are then each provided with a sputum cup and a wooden tongue depressor and are told to bring a specimen of their next stool to the unit dispensary. We are careful to issue instructions that tongue depressors after being used to procure the specimen shall be thrown into trash cans, which are installed at each toilet. This is to prevent possible contamination of the ground with hookworm ova, as well as the blocking of drains from leaving the depressors in toilet bowls.

Each cup has the man's name, State, rating, and platoon number written upon the cover. In order to obtain all specimens from a platoon at as nearly the same time as possible, men who have reason to believe that their bowels will probably not move by 9 a. m. the following day are advised to take one vegetable cathartic pill, which is provided at the time that they receive the sputum cup. A larger dose of laxative is undesirable on account of the watery character of the resulting stool.

After the receipt of reports from the station laboratory, where all examinations are made, the men who are reported positive for hookworm are assembled at the unit dispensary and treatment is given.

At the time that the carbon tetrachloride treatment was instituted, February 23, 1924, it was considered advisable to begin the routine medication with rather less than the average adult dose, which is 3 c. c., since a majority of the recruits are boys under the average

adult size and as the treatment was to some extent experimental in our hands. The large 00 hard gelatin capsule holds exactly 1 c. c., so the routine dosage was fixed at two capsules of carbon tetrachloride.

In view of the fact that practically no toxic symptoms were encountered in the treatment of over 400 cases, the dosage was raised to 3 c. c., or the contents of three capsules. On this dosage, with the technique noted later, a majority of patients when questioned as to symptoms report some slight tendency to vertigo, with occasional nausea and mental hebetude coming on within two hours after treatment. Vomiting is quite uncommon. We have record of only five cases who did not feel fit for duty on the morning after the drug was taken, and of these only one gave us any concern. This boy complained of persistent nausea and vomiting, with pain and tenderness over the liver. Physical examination was negative except for the hepatic tenderness. He stated that his bowels had not moved freely since taking the medicine, and free purgation with magnesium sulphate removed all symptoms promptly.

Since all men who receive treatment are placed upon the binnacle list until the following morning sick call, the medication for each platoon is carried out toward the end of the working-day, after drills and lectures are over. Thus the men lose a minimal amount of time from instruction, and the drug is given on an empty stomach about 3.30 p. m. The three capsules of carbon tetrachloride are washed down with an ounce of saturated solution of magnesium sulphate. The men are given the freedom of the unit, sleeping in their own hammocks, but are cautioned to eat lightly of supper and to avoid all fatty and greasy food, reporting to the dispensary if any untoward symptoms develop. It will be noted that we carry out no special dieting, either before or after treatment, as appears to be so essential in other forms of anthelmintic therapy. The medical officer will, of course, remember that all other substances which increase the absorbability of carbon tetrachloride, such as alcohol, must be avoided while this drug is in the alimentary tract. In a detention unit no caution of this kind is necessary.

Except for the avoidance of oily food it appears unnecessary, and may even be harmful, to restrict the diet before and after treatment or to employ preliminary purgation. Practically all our patients return to duty the following morning after treatment feeling perfectly well.

Test of the result of treatment is carried out five to seven days later by procedure essentially the same as that for procuring the first specimen.

It would appear desirable to delay the follow-up test somewhat longer than this for reasons noted later, but this has not been practicable under the conditions of our work.

In case a positive report is received following treatment, the drug is repeated until negative findings are secured. In the series of 406 cases treated by 2 c. c. of carbon tetrachloride, 21 men required a second treatment and 3 men required three treatments before a negative report was received. Of the 6 cases out of 177 who were positive after receiving 3 c. c. of the drug, 5 were transferred and treatment continued elsewhere. One man treated by us was negative after the second treatment. The desirability of the administration of magnesium sulphate simultaneously with carbon tetrachloride or other toxic anthelmintic has been pointed out by Hall, who quotes Macht and Finesilver as demonstrating that the administration of magnesium sulphate together with other drugs inhibits the absorption of these drugs by the patient. Lambert, in reporting 7,000 cases in Fiji, notes no loss of efficiency with this mode of carbon-tetrachloride treatment and also states that unpleasant toxic symptoms are less common when the drug and salts are given simultaneously. Hall and Shillinger's experiments with dogs seem to confirm these opinions.

Bureau of Medicine and Surgery Circular Letter No. 249-1923 of March 5, 1923, drew attention to the probable advantage of the combination of magnesium sulphate and carbon tetrachloride in treating hookworm infection.

In a statistical study of any mode of hookworm treatment two prominent potential sources of error seemed evident. One is the human factor on the part of the laboratory worker who makes the examination and the other is the possibility that a negative finding a few days after treatment is due to the elimination of most but not all of the parasites, with temporary inhibition of ovulation from the stupefying effect of the anthelmintic on a few remaining worms. With these thoughts in mind, in the autumn of 1924, we attempted to check up on the late results of treatment. In the office of the unit where the recruits receive their final training before entering the trade schools or going to sea, a card-index file indicates the final disposition of each man. By the aid of this file we found that 21 men who had received hookworm treatment more than two months previously were still on duty at the naval base. Specimens from all of these men were secured and examined, with positive reports for hookworm in three cases. This is, of course, too small a series for any percentage estimation of therapeutic results, but it at least illustrates the fallacy of attempting to gauge ultimate results accurately from only a single examination following treatment.

The classical textbook symptoms of hookworm infection—pallor, weakness, listlessness, enlarged abdomen, and epigastric distress—can not be relied upon in diagnosis of cases in the southern United

States. We have frequently noted with surprise the apparent rugged, vigorous health, high color, and evident mental keenness of men who were reported positive for hookworm. In order to estimate the amount of blood change resulting from uncinariasis, 50 infected men, chosen at random, were sent to the laboratory for blood examination. For various reasons the records of only 28 of these tests are available, but the figures are quite interesting in the light of their marked discrepancy with data indicating marked hemoglobinemia and eosinophilia which are usually recorded in the literature on this subject.

The average hemoglobin estimation for 28 men was 83 per cent and eosinophiles 4 per cent. Blood smears in three cases showed no eosinophiles, and 50 per cent of the cases had 3 per cent or less of eosinophiles. The highest count was 9 per cent in one case.

No attempt was made in our study to estimate the degree of hookworm infestation in individuals. It would seem probable that most of our cases were examples of light infection. Men with heavy infections, showing the classical symptoms to a marked degree, would not, of course, be likely to pass the medical officer at recruiting stations.

From several sources we have heard of pronounced toxic symptoms resulting from carbon tetrachloride administered for hookworm. One medical officer told us that he considered the treatment very unsatisfactory, since nearly all his patients vomited the drug very shortly after its administration with water. It would seem that the difficulties encountered were due to improper technique. We believe that the following points are extremely important.

- (1) Be sure that the drug is chemically pure and given on an empty stomach.

- (2) Do not give more than 3 c. c. to a full-grown adult.

- (3) Grade the dosage to some extent in relation to body weight; and

- (4) Administer magnesium sulphate simultaneously with the drug.

Of 406 cases given one dose of 2 c. c. of carbon tetrachloride, 351, or 86.4 per cent, were reported negative for hookworm ova. Of 177 cases given one dose of 3 c. c. of carbon tetrachloride, 171, or 96.6 per cent, were negative for hookworm ova.

During the past seven years nearly 16,000 specimens of feces were received at the station laboratory from incoming recruits, not counting those reexamined after treatment. About one-third of the examinations were made by using the Bass centrifugal method, in which a portion of stool approximately the size of a hickory nut is emulsified in a test tube of water and strained through gauze into a

centrifuge tube. The filtrate is centrifuged in an electric centrifuge at high speed for about 10 seconds, the supernatant fluid poured off, the tube refilled with water, and the sediment thoroughly emulsified. The tube is again centrifuged at high speed for a few seconds, the supernatant fluid poured off, and the residue examined for ova. This method gives beautiful preparations and a high percentage of positives, but it was replaced by the Barber method in the majority of the examinations, because the latter method facilitated the work and gave but a slightly lower percentage of positives for hookworm ova. In this method a portion of feces about the size of a hickory nut is placed in a clay petri dish cover and emulsified in about 20 c. c. of a solution composed of equal parts of glycerin and saturated magnesium-sulphate solution. Due to the high specific gravity of the fluid, the ova rise to the surface and are skimmed off and placed on a slide by the use of a medicine dropper. The surface of the fluid on the slide is then examined microscopically for ova. The medicine dropper must be dropped in boiling water before being used again, as hookworm ova tend to cling to glass, and if not destroyed by heat might be carried over to another specimen.

The following table shows the State from which the recruit came, the number of specimens examined, and the percentage positive for hookworm ova.

TABLE 1

State	Number examined	Percentage positive for hookworm	State	Number examined	Percentage positive for hookworm
Florida.....	785	43.5	Louisiana.....	136	12.5
Alabama.....	986	34.7	West Virginia.....	848	12.0
North Carolina.....	2,630	31.4	Texas.....	248	10.0
South Carolina.....	1,106	31.1	Missouri.....	64	9.0
Georgia.....	2,181	30.8	Arkansas.....	113	7.9
Mississippi.....	189	19.5	Maryland.....	1,543	4.4
Kentucky.....	596	15.7	Unknown.....	1,401	24.9
Virginia.....	2,242	15.7			
Tennessee.....	841	15.6	Total.....	15,929	23.3
Oklahoma.....	21	14.2			

In Figure 1 we have endeavored to present graphically the percentage of positive hookworm cases found in those States from which a sufficient number of specimens have been obtained to form an idea of the prevalence of the disease.

SUMMARY

(1) Hookworm disease was found in 23.3 per cent of 15,929 young adult males from Southern States, varying in incidence from 4.4 per cent in Maryland to 43.5 per cent in Florida.

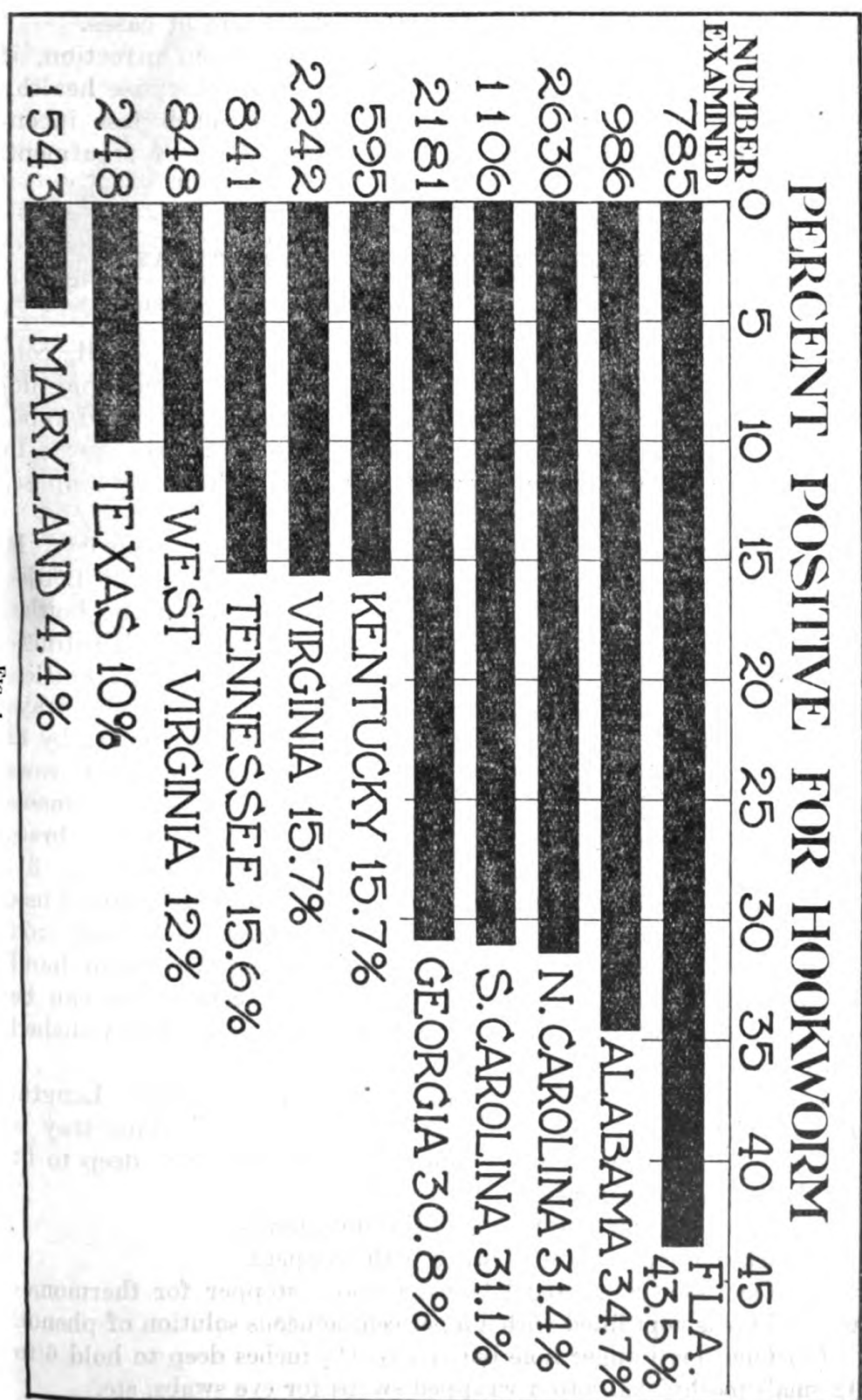


FIG. 1

(2) One dose of 3 c. c. carbon tetrachloride caused the hookworm ova to disappear from the stools in over 96 per cent of cases.

(3) Carbon tetrachloride treatment for hookworm infection, if properly carried out is essentially harmless to an otherwise healthy host and gives a higher percentage of cures at much less inconvenience to the patient than any other known form of treatment.

A NEW BEDSIDE TREATMENT AND DRESSING TRAY

By P. R. STALNAKER, Lieutenant Commander, Medical Corps, United States Navy

1. Many naval medical officers who have seen this small, convenient, and compact bedside treatment tray have asked that details for making it be published. In order to save work and repetition in answering individual requests and to enable the corps to have the use of this simple convenience it was decided to do so. Utility, low cost, and convenience are claimed for it.

2. The accompanying drawings are largely self-explanatory. It is of course optional what solutions shall be placed in the bottle-containers; also the number of containers or the size of the bottles or the size of the tray as a whole. After experimenting with different sizes of trays, different materials, different number of bottles, and sizes of bottles I finally adopted for my own use the trays sketched herein. The tray can be made either of plain wood (2 by 12 inch board) (Fig. 2) or with a shelf with auger holes in rows spaced and bored to fit neatly the sizes of the bottles and glasses (Fig. 1), or it can be made of a thin piece of sheet metal (brass or preferably thin galvanized 20-gauge sheet metal (Fig. 3). Personally I like the plain wooden one (Fig. 2) best for general use, as it is lighter and easier to carry, or the galvanized sheet iron rather than the brass, as the latter spots easily even from hand perspiration or solution droppings, etc. The wooden ones can be either stained and varnished or painted and the sheet metal polished with emery cloth and steel wool.

3. The size of the tray as finally adopted is as follows: Length, 14-15 inches; width, 8½ inches; thickness, 2 inches. This tray is spaced off in rows with auger holes bored one-half inch deep to fit the following containers:

- (a) Three regular-size 8-ounce drinking glasses.
- (b) Eleven empty iodine bottles with stoppers.
- (c) One empty protargol bottle without stopper for thermometers. This is kept filled with a 5 per cent aqueous solution of phenol.
- (d) One small auger hole bored 1 to 1½ inches deep to hold 6 to 12 small toothpicks, cotton-wrapped swabs for eye swabs, etc.

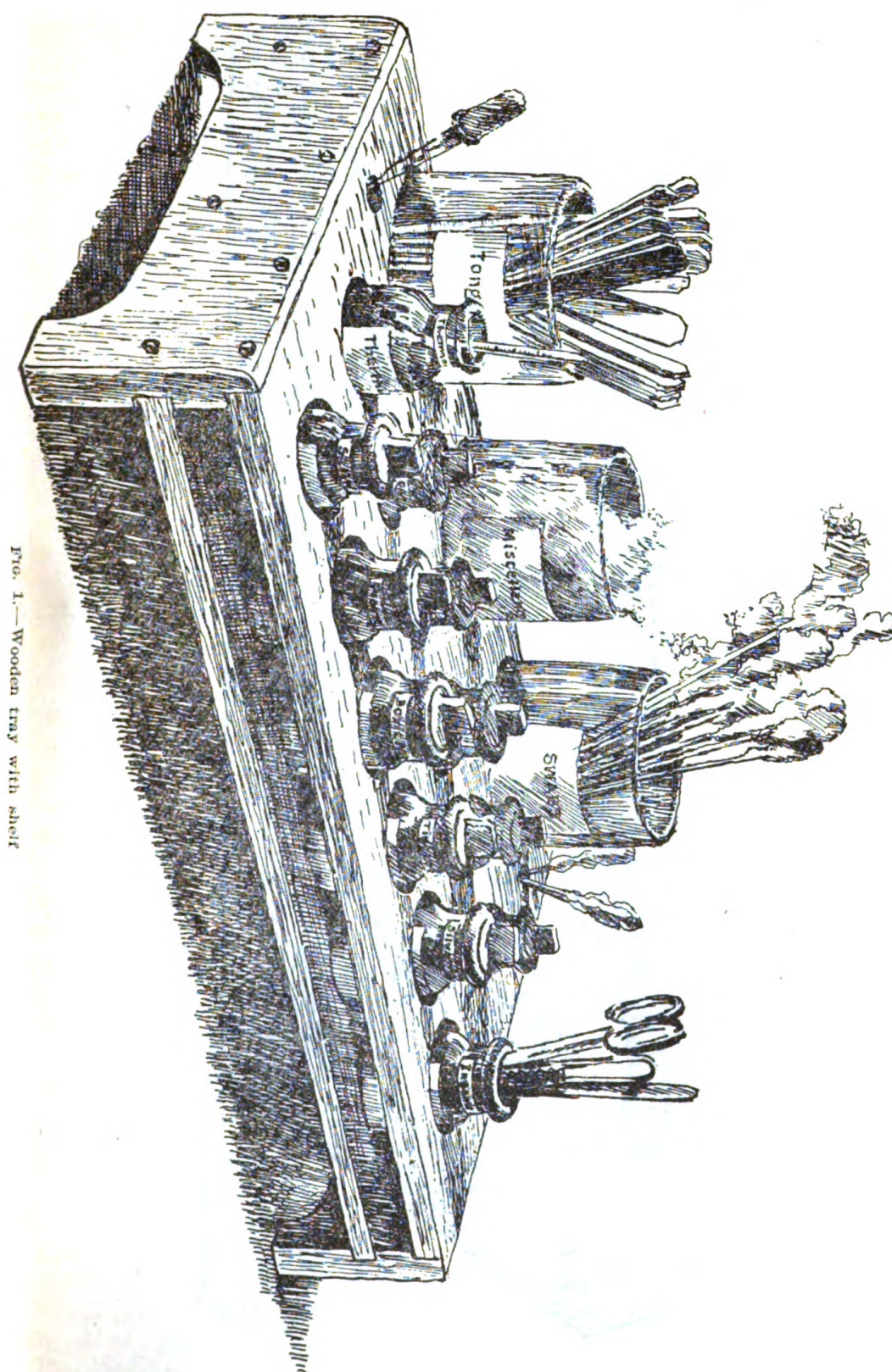


FIG. 1.—Wooden tray with shelf

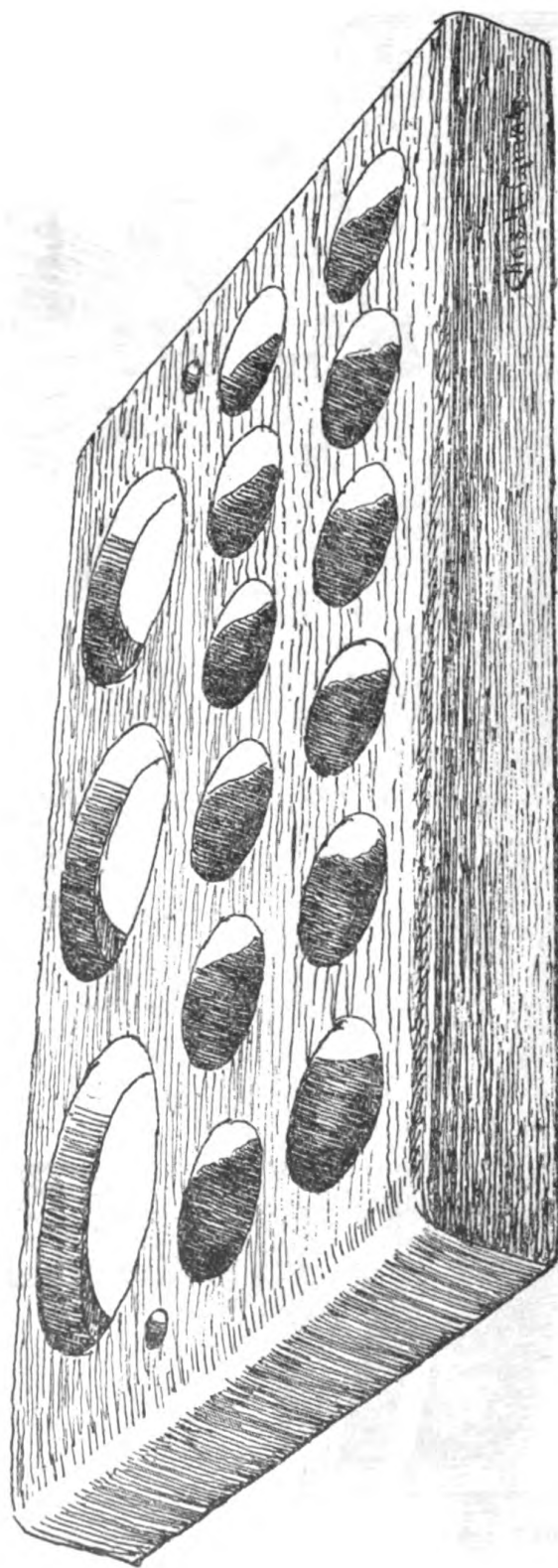


FIG. 2.—Wooden tray without shelf

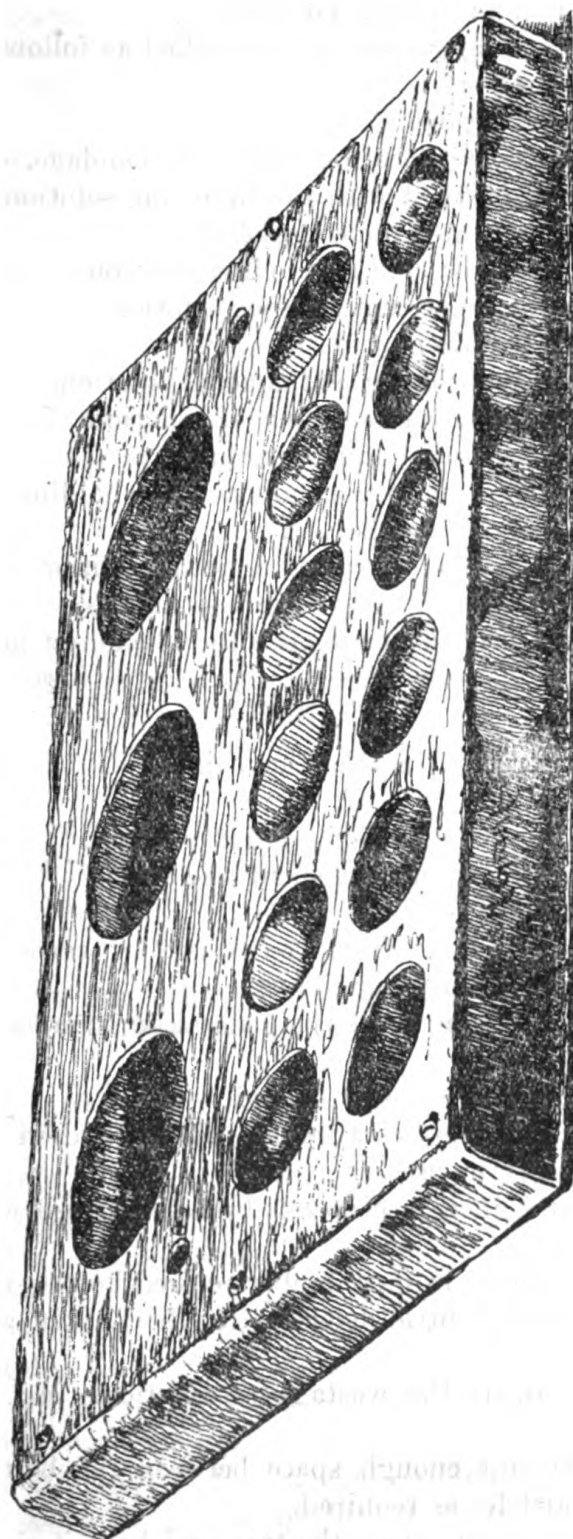


FIG. 3.—Metal tray

(e) One small auger hole bored 1 to 1½ inches deep to hold a clean medicine dropper in an upright position.

4. The three drinking glasses are kept filled as follows:

(a) Tongue depressors.

(b) Cotton throat swabs.

(c) Miscellaneous, with cotton, gauze, a bandage, etc. The 11 iodine bottles are kept filled with the following solutions:

(a) Boric acid, saturated aqueous solution.

(b) Glycerite of tannic acid and iodine solution.

(c) Silver nitrate, 2 per cent aqueous solution.

(d) Normal salt solution.

(e) Argyrol or silvol, 20 per cent aqueous solution.

(f) Mercurochrome, 1 per cent aqueous solution.

(g) Picric acid, saturated aqueous solution.

(h) Phenol, 2½ per cent aqueous solution, for holding instruments; as knife, scissors, forceps, probe, etc.

(i) Sodium bicarbonate, saturated aqueous solution.

(j) Pure phenol solution to sterilize instruments.

(k) Denatured alcohol to neutralize the phenol on instruments.

SUMMARY

(1) Can be constructed in a few moments.

(2) Easy to care for.

(3) Inexpensive—the cost being practically nil.

(4) Convenient in size arrangement and shape.

(5) Compact.

(6) Easily transportable from bed to bed in wards or rooms or anywhere on ship, even in a rough sea.

(7) Ornamental—it improves the general appearance of the ward treatment table.

(8) Neat and bottles properly spaced.

(9) Solutions and supplies always available and in their proper places ready for instant use.

(10) Bottles and glassware do not break in rough weather or at target practice.

(11) Solutions being in dark amber-colored bottles with ground-glass stoppers, there is little deterioration from light and evaporation.

(12) Economical, as the wastage of solutions, etc., is cut to a minimum.

(13) There remains enough space between the bottles to carry other necessary articles as required.

(14) It is very easy to clean the tray and keep it clean.

(15) Replacement containers are empty drinking glasses and iodine bottles, which are always available. The thermometer con-

tainer is an empty protargol bottle, which is deeper and is used without a stopper.

(16) Containers are of sufficient size to contain enough material to do for the ordinary sick call and yet not so large that solutions deteriorate.

(17) The wide-mouth bottles permit easy ingress and egress of swabs, medicine droppers, instruments, camel-hair brushes, syringes, etc., as required. This also permits easy and rapid and proper cleaning of the small bottles.

(18) The stoppers being ground glass with a substantial finger lip are always easy to remove and insert and not easy to break.

(19) The bottles are low with a good base and not easily upset if articles such as long instruments, forceps, scissors, probes, knives, etc. are left unsupported in them, as in removing stitches, etc. at the bedside.

(20) The bottle holding the thermometers is a little taller than the others in order to reach more of the surface area of this instrument, thus insuring better disinfection.

(21) The contents are renewed or refreshed and properly labeled in the dispensary every morning before sick call.

(22) This tray is recommended for general ward and sick-bay use. It is a small, inexpensive, compact, combined, portable, utility treatment and minor dressing tray. It is found very convenient in treating officers sick in their rooms.

(23) Different trays are equipped for the sick bay, isolation ward, and other wards as required.

OBSERVATIONS ON THE ANNUAL PHYSICAL EXAMINATIONS AT NAVAL OPERATING BASE, HAMPTON ROADS, VA.

By M. E. HIGGINS, Lieutenant Commander, Medical Corps, United States Navy; F. CERES, Lieutenant Commander, Medical Corps, United States Navy; and O. WILDMAN, Lieutenant, Medical Corps, United States Navy.

It is apparent that the new forms adopted by the Bureau of Medicine and Surgery for use in the annual physical examinations constitute a decided improvement both in the matter of record and in the matter of conducting these examinations.

In the examinations recently held at the naval operating base, Hampton Roads, Va., 152 officers were examined with the results shown in the accompanying table.

The examinations were greatly facilitated by the cooperation of the commanding officers of the various activities, who issued orders to the officers concerned assigning them a definite date and hour at which they were to appear before the board. Eight officers were examined daily, four in the forenoon and four in the afternoon.

This allowed sufficient time for the necessary paper work and gave 30 minutes for the actual examination of each officer. The procedure was as follows: The recorder secured the necessary information from the health record and handed the form to the examinee, who was then examined by the dental officer. The teeth were charted and the examinee given any instructions regarding necessary dental treatment, and an appointment was made for any X-ray examinations when necessary. When the dental officer completed his work the examinee entered a dark room, where the eye, ear, nose, and throat examinations were made. After this the hearing and vision were tested and a specimen of urine was obtained. The examinee then disrobed in a small dressing room. He was then weighed and measured. With the examinee standing, the skin, muscles and joints, glands, heart, and lungs were examined, Romberg and tremor tests made, examinations for hernia and hemorrhoids carried out. The examinee was then placed on a table, where the reflexes were tested and an abdominal examination made. For the remainder of the examination the examinee was seated in front of the examiner at a small table, where the temperature was taken and the pulse and blood pressure observations made.

By following the above routine in each case time was conserved and thoroughness secured.

Defective teeth constituted the greatest number of defects, occurring in 79 cases, a rate of 519 per 1,000. In connection with the dental examinations 262 dental radiograms were made. The number of dental defects noted emphasizes the need for closer collaboration between the medical and dental officers.

In conducting the special examinations the examiners alternated in order to take advantage of the opportunity afforded for experience in making these special examinations. Unusual cases and those requiring more extensive diagnostic procedure were referred to the eye, ear, nose, and throat specialist.

Upon recommendation of the board, three officers were sent to the naval hospital for observation and study. Minor defects were discussed with the officer concerned. Where defects were more serious, but not sufficiently grave to warrant hospitalization, the officer was advised in writing of the conditions and instructed to consult with his senior medical officer.

The health-conservation feature of the examination was pointed out to all officers, and there was in general a very hearty appreciation of the value of the examination in this respect. The results show beyond question to what an extent individuals who are apparently in good health and performing their routine duties present departures from accepted standards of physical fitness and normal health ideals and accentuate the value of these examinations as a

valuable addition to the field of preventive medicines both from the viewpoint of the officer himself and the service.

If any disability is found, it is usually discovered before symptoms of a serious nature have appeared, and corrective measures can be applied when the condition is in its incipency. Where no defects or only minor ones are found, the knowledge of this fact is a source of satisfaction to the officer concerned and gives him a sense of security and optimism which can not fail to add to his efficiency and well-being.

Number of defects found and rate per thousand

Defects	Number	Rate per 1,000
Defective vision, not corrected	30	197.36
Defective vision, corrected to 20/20	26	171.05
Weak color perception	1	6.57
Defective hearing	13	85.49
Abnormalities of nose and throat	66	435.21
Arterial hypertension, moderate	6	39.47
Arterial hypertension, high	2	13.15
Abnormal urinalysis, albumin and casts	16	105.26
Diseases of the skin	20	131.51
Flat feet	1	6.57
Defective teeth	79	519.73
Hemorrhoids	8	52.63
Hernia	2	13.15
Glycosuria	2	13.15
Bunion	4	26.31
Enlarged thyroid	1	6.57
Varicose veins	6	39.47
Overweight	35	230.26
Underweight	6	39.47
Hypotension	1	6.57
Extrasystole	1	6.57
Radiograms, dental	262	1,723.68

Total number examined 152.

A CASE OF MASKED APPENDICITIS

By J. F. HAYS, Lieutenant (Junior Grade), Medical Corps, United States Navy

The object of this report is to show how serious a pathological condition may exist in the abdominal cavity without any symptoms pointing to the same until the time that a serious abdominal catastrophe has occurred.

J. D. M. reported at the sick bay complaining of sore throat, chills and fever, headache, pains in his long bones, and general malaise. Upon examination he was found to have acute follicular tonsillitis. He was put to bed and given the following treatment: An initial saline cathartic, preceded by calomel, grains 2; ice bag to his throat; biniodide of mercury, grains 1/200, every hour for five doses; tonsils cleaned with hydrogen peroxide and guaiacol applied. His temperature was 101, pulse 97, and respiration 21. The patient apparently made an uneventful recovery from the tonsillitis in six days. On the sixth day he began to have some slight pain in his abdomen which seemed to be localized about 1 inch to the right

of the umbilicus in an area about the size of a silver dollar. A thorough physical examination revealed nothing pathologic, and there was no evidence of any intra-abdominal trouble. This pain lasted for three days, but did not increase in severity. Examination each day with results as just noted. On the fourth day he complained of nausea. Until this time the patient's appetite had been good, but he had been restricted as to the amount he was to eat. Now he had no appetite. Blood count was 10,050. He had been kept on the same treatment since the development of the abdominal pain, consisting of rest in bed, restricted diet, soapsuds enemas, and a hot-water bottle to his abdomen. At 6 a. m. on the morning of his eleventh day in the sick bay the medical officer was called to see him. He was complaining of severe abdominal pain, vomiting, headache, and restlessness. His temperature, which for the past five days had never been above 99, rose to 101. The pulse, which had been around 78, suddenly jumped to 100. The pulses were equal, regular, of small volume, and had a tendency to be thready. The respirations were 20. Examination showed tenderness over the whole abdomen, with spasmodic rigidity on moderately deep palpation. No masses were palpable, and the point of extreme sensitiveness was at the right of the umbilicus, as previously noted. Blood count was 11,500. Urine negative. Ice bag ordered for his head and hot-water bottle to his abdomen. At 8.30, his temperature dropped to 97, pulse to 110, and respirations to 20. White blood cells, 15,000. He had the typical Hippocratic countenance—sunken flushed cheeks, pinched nose, the nostrils dilated on inspiration, and an anxious look. There was board-like rigidity of the abdomen with extreme sensitiveness to touch. There was no evidence of distention.

The diagnosis at this time was apparent, and he was prepared for operation at once. Under ether anæsthesia, the abdomen was opened through a McBurney incision, and on cutting through the peritoneum a sero-purulent fluid which had a very foul odor, typical of that produced by *B. coli*, escaped. The appendix was delivered with difficulty after breaking down and forcing loose numerous adhesions which bound the cæcum and ascending colon down tightly. The appendix was gangrenous, it having ruptured close to the tip on its mesial side. A portion of the omentum, which was a gangrenous mass, was carefully tied off and excised. The appendix was unusually large in diameter, due to inflammation and œdema. A rubber tube was introduced into the pelvis through the lower portion of the incision and the wound closed. On leaving the operating room the patient was in poor condition and stimulants were administered freely. He was placed in the Fowler position and on

Fowler's treatment. The patient made a slow recovery and the wound drained freely. On the eighth day he was transferred to the U. S. S. *Relief*.

REMARKS

There is no question in our minds but that the appendicitis was secondary to the tonsillitis. The symptoms, however, were confusing and misleading, and it was difficult to make a definite diagnosis from the symptoms presenting. It will be noted that not until 6 o'clock of the morning upon which the operation was performed did he present distinct tenderness or show any signs of rigidity or any of the objective symptoms indicative of appendicitis. There are also called to the attention of the reader the results found on opening the abdomen. Neither the subjective nor the objective symptoms present gave any intimation of the severity of the intraabdominal condition.

NOTES AND COMMENTS

THE UNITED STATES VETERANS' BUREAU MEDICAL BULLETIN

The new United States Veterans' Bureau Medical Bulletin made its initial appearance with the July, 1925, number. It is a welcome addition to the ranks of the service medical journals, and the UNITED STATES NAVAL MEDICAL BULLETIN wishes for it all success. Every medical and dental officer of the Veterans' Bureau is required to submit at least one paper a year upon some phase of his work with a view to its publication if found suitable by the editor. (A similar rule would simplify matters greatly for our own BULLETIN.) The papers will be selected for publication upon the basis of their value to the medical officers of the service in aiding them to improve the condition of the patients under their care. As is the case with other Government publications, there will be no editorials. The cover design adopted is an attractive one, and the subject matter of the first number is well worth reading. Much of it deals with tuberculosis, and in the section on pathology, which will be a monthly feature, several excellent plates showing various lesions of pulmonary tuberculosis are given. The editor of this new journal is Dr. Karl Schaffle and the associate editors are the members of the medical council, among whom are many men with international reputations in medicine.

With the unlimited wealth of material available for study and research there is little question but that the United States Veterans' Bureau Medical Bulletin will soon become a journal of recognized value, not only to the personnel of the bureau but also to the profession at large. Again we bid it welcome and wish for it great success.

SOME ADVANCES OF CHEMOTHERAPY

The introduction of salvarsan by Ehrlich stimulated other workers to search for the "therapia sterilisans magna." Arsenic, having long been known for its beneficial effects in protozoal diseases, was naturally the basis for many of the drugs developed and heralded abroad as specifics for syphilis, trypanosomiasis, amebic dysentery, and many other diseases. The coal-tar products are probably the

oldest synthetic chemical agents used in medicine. In recent years these have been combined with the various metals to form many of our most potent drugs. More recently the dye industry has contributed its share to medicine, and to-day there are many preparations composed of various dyes in combination with metals, and many more are in process of development. Some of these are of immense value, others of less or no value, and it is possible that among these drugs there may eventually be one that will fulfill the hopes of its originators and prove to be in fact the long-looked-for, infallible remedy for one or several of the diseases which to-day are exacting their toll of human life and causing untold misery. Such is an end devoutly to be wished.

Strange to say the difference between the safe and potent remedy and the unsafe, practically useless one is often only an organic radical misplaced or substituted for another. Only the expert chemist is capable of getting the radicals and metals into proper combination, and only the expert pharmacologist is able to experiment with the new drugs as they are developed to find their proper dosage and to determine their safety for human use. It behooves the rest of us to wait patiently and gather reports and statistics from all reliable sources, especially from well-organized and widely known clinics, before we attempt the use of the drugs upon our patients. Especially is this true in such a service as the Navy, in which men have enlisted to serve their country and to die for it if necessary, but not to die as a result of medical experimentation.

Among the chemical preparations which are in use in present-day medicine, most of them being used intravenously, may be mentioned salvarsan, neoarsphenamine, and the many other arsphenamines, stovarsol, tryparsamide, the dichloramins, the bismuth preparations, gentian violet, acriflavine, and mercurochrome-220 soluble.

To review all that has been written about these remedies and their use and abuse would require much time, and such a review would fill several volumes. However, the use of some of them is so widespread that it is important that members of the Medical Corps should be well informed as to recent reports concerning their use. It has therefore seemed advisable to review briefly the recent literature concerning two of these drugs—stovarsol and mercurochrome.

During the past year much interest has been shown in the military and naval services of the world, as well as among civilian populations, in the study of syphilis—its cure and, particularly, its prevention. Much has been written on the subject, and many new methods of prevention have been brought forward, some to be discarded after a short time as useless or dangerous, while others are still being investigated.

According to the *Lancet* (vol. 1, No. XV, April 11, 1925), in 1922 Levaditi and Navarro-Martin began the study of the spirillicidal action of bodies related to atoxyl. Among the series studied was the acetyl derivative of amino-oxy-phenyl arsenite of sodium, 190, or stovarsol. They found that stovarsol was readily absorbed from the alimentary tract. The experiments of Levaditi and Navarro-Martin were conducted by the oral administration of the drug. After proving its curative power upon spirochetal infections in rabbits, they applied it to human syphilis. "In collaboration with A. Marie, Levaditi and Navarro-Martin performed a very interesting experiment. A volunteer was scarified on both arms and a 'virus dermatrope' was rubbed in. At the same time a monkey was inoculated with the same virus. Two and a half hours later 2 grams of stovarsol were given to the human subject by mouth, and the dose was repeated 16 hours later. Whereas the monkey developed typical syphilitic lesions, the volunteer rested immune from any symptoms, and his Wassermann reaction remained negative throughout. This experiment suggested that stovarsol might be used as a prophylactic." This was tried, and it was conclusively shown that the drug, taken by mouth, was effective in protecting against syphilis. Among other tests made, it was demonstrated that stovarsol, by mouth, could protect against infection the wives of men with primary lesions. From 2 to 4 grams may be given. The investigators claim that "in stovarsol lie the properties of the ideal prophylactic substances."

Stovarsol has been used with success in conditions other than syphilis. Reports of its use, with varying degrees of success, in amebic dysentery, lamblia infections, and frambesia have been made. From an experimental point of view, Worms considers that the drug possesses marked protective powers, but that in order to get complete protection there is danger of pushing the drug to toxic limits.

"It could hardly be expected that the new remedy would prove to be entirely free from the disadvantage which limited the practical value of its predecessors—the difficulty of finding a dosage adequate for the destruction of the invading organism and yet not toxic to the tissues of the host. However that may be, the convenience of oral administration is so great that the profession will welcome the introduction of this compound. If the results hitherto obtained are substantiated in wider fields, there can be no doubt that the drug is a remarkable advance on former products."

In the February, 1924, number of the UNITED STATES NAVAL MEDICAL BULLETIN, comment was made upon the possibilities of stovarsol as a curative agent in syphilis. Since that time but few reports of its use in this connection, except in France, have appeared in the

literature. In France, however, it has been used on a large scale by Fournier, who reports very favorably upon it. It would seem that if the drug possessed the virtues claimed for it it would be in more general use by this time. If it be effective in preventing and curing syphilis, its ease of administration alone would render it superior to all the arsphenamines and other drugs which must be given intravenously.

Although stovarsol was introduced as a remedy for syphilis and has so far failed to prove itself—at least in this country—it has been extensively used in the treatment of other disease conditions with great success, as is shown in the following extracts from the current literature.

P. H. Manson-Bahr, writing in the Tropical Diseases Bulletin for April, 1925, on "Recent developments in the treatment of amœbiæsis," says:

"Stovarsol, a preparation introduced by Fourneau (Fourneau, 190), has been used on a large scale by Fournier in the treatment of syphilis. It is a tasteless substance, absorbed without the production of any disagreeable phenomena, and is given by the mouth in 4-gram tablets. Stovarsol has been reported upon mainly from French sources. It was first applied to the treatment of amebic dysentery by Marchoux (1922), who found that cysts of *E. histolytica* which had persisted after a full course of emetine treatment disappeared after the exhibition of stovarsol, 4 grams twice daily; a course of 20 pills or tablets cured a case of four years' duration. In refractory cases he gives 4-gram doses every second day for two months. Lâtterly, Garin and Lépine, Nogue and Leger, and Delanoë have reported favorable results, expressing the opinion that stovarsol should be regarded merely as an adjuvant to emetine treatment and that it does not necessarily protect against relapses. Flandin favors a new allied compound known as treparsol (meta-amino-para-oxy-phenyl arsinic acid), which contains 28.75 per cent of arsenic as compared to 27.2 per cent in stovarsol. It is apparently given in the same dosage. These drugs are decomposed in the intestine and eliminated in the urine.

"The reviewer has lately had considerable success in two emetine-resistant cases of amebic dysentery with stovarsol in the doses recommended above. Material improvement in the general condition of the patients was noted, together with the disappearance from the feces of *E. histolytica* cysts which had persisted after a thorough course of emetine bismuth iodide."

In the May, 1925 number of the same bulletin, A. Alcock abstracts an article by E. Marchoux on "Action du stovarsol sur le parasitisme intestinal," which appeared in Paris Médical, November 22, 1924. The reviewer says, in part:

" * * * Of 59 cases of intestinal amoebiasis—mostly old cases that had already suffered much and varied treatment—57 were cured by a course of stovarsol, the two incurable cases being also resistant to every other appropriate kind of treatment. In the successful cases cysts or amoeba disappeared in two or three days, and recovery was complete in about a week, as judged by subsequent observation for six weeks. The duration of the stovarsol course was six weeks. For recent cases the course consisted of 0.5 gram stovarsol daily for the first three weeks and 0.25 gram daily for the last three weeks. For recent cases the course consisted of 0.5 gram stovarsol daily for increased to 1 gram on the third and fourth days, then 1 gram every second day until the eighth, then 0.75 gram every second day for a week, reduced to 0.5 gram for another week, and finally 0.25 gram daily for three weeks. The drug was given in tablet form with meals. No special dietary was ordered, but tobacco, butter, and wine, and fermented liquor were forbidden, and any concurrent dyspepsia was appropriately treated.

"In 21 cases of giardiasis the symptoms and condition of the patient were always ameliorated, and in some cases the parasites disappeared quickly, but in others their disappearance was only temporary. The stovarsol course here was of the interrupted kind; it began with respective doses of 0.5, 0.75, and 1 gram daily on the first three days and continued with 1 gram daily for the next three or four days, then an interruption for four days, then a repetition, and so on for three weeks.

"Blastocystis, which when it is extremely abundant the author regards as causing irritation and diarrhea, disappears completely after small doses of stovarsol.

"Divers bowel complaints and attendant toxic neuralgias are relieved by stovarsol, which the author believes to act by activating the digestive ferments while sterilizing the waste products of their action."

In the New Orleans Medical and Surgical Journal of May, 1925, F. M. Johns and S. C. Jamison reported their results in the treatment of 27 cases of amebic dysentery with stovarsol. The cases ranged in severity from chronic dysentery of long duration to active, severe cases; the duration of the disease from a few weeks to 25 years. Diagnosis in all cases was verified by finding endameba in the stools or in scrapings obtained through the proctoscope. All patients but one received stovarsol in 0.25 gram doses t. i. d. for one week, and symptoms subsided in one week.

"The first case treated was found to have developed encysted endamebæ on the fifteenth day following stovarsol treatment, in spite of the hypodermic administration of emetine during the interval.

The fourth case presented a clinical relapse on the sixteenth day, vegetative endamebæ being found in the semiliquid stool.

"Three cases remained well and free from endamebæ up to the present time upon the one course of treatment. Two of these received seven $\frac{1}{2}$ -grain doses of emetine, which was hardly sufficient to account for a cure by itself. These patients have been under observation for 99, 74, and 70 days, respectively.

"The remaining cases have received a second course of stovarsol 7 to 10 days after the first, and consisting of three 0.25-gram tablets per day for 7 days, or two tablets for 12 or 14 days."

Up to January 20, 1925, the authors had followed with clinical, proctoscopic, and microscopic examination 20 cases for an average period of 55 days after completion of treatment. Sixteen cases remained well and free from endamebæ during this time. Four cases relapsed. Even in the cases relapsing it was noted that the lesions had subsided markedly.

The authors conclude their paper with the following statements as to dosage:

"One-quarter gram per day in one case failed to influence the symptoms to any great extent in seven days.

"One-half gram per day has given favorable results in two sub-acute cases.

"Three-quarters gram per day for seven-day periods has shown the most uniform results in the first course."

"In the meantime, our experience so far indicates that we have in stovarsol a supposedly harmless remedy for amebic dysentery that compares quite favorably with anything previously employed."

In the discussion that followed the reading of this paper, Dr. A. L. Levin brought out the facts that Volenti had reported two cases of malaria treated with stovarsol with excellent results; Bernard, one case of *Lamblia* infection and one of *balantidium coli* infection cured.

Dr. C. C. Bass stated that he had watched some of the cases treated by Doctor Johns and had been much impressed with the fact that they were getting better results than he had ever seen with emetine.

According to an abstract in Tropical Diseases Bulletin for April, 1925, L. Convy, in the Bulletin de la Société de pathologie exotique for July, 1924, states that in Vincent's angina and ulceromembranous stomatitis stovarsol is very useful. Tablets are broken up in a little water or glycerin to form a paste which is applied to the previously cleaned surface three or four times daily; 0.25 per cent solution of stovarsol is used as a mouth wash. Improvement begins in 12 hours, and after 24 hours the lesions are clean and bacilli and

spirochetes are hard to find. Treatment has never been necessary for more than three days.

Stovarsol has been used in many and varied conditions with varying success. That it is a useful addition to our list of remedies seems to have been proved, and its more general use in this country may be expected.

Mercurochrome-220 soluble has also been used in various disease conditions and with varying success. On the whole, reports show that it is valuable in many conditions which, before its introduction, were apparently hopeless. It has recently been added to the supply table and will soon be available for use by naval medical officers. For this reason the following abstract of "The treatment of infections and infectious diseases with mercurochrome-220 soluble," by Hugh H. Young, M. D.; J. H. Hill, M. S.; and W. W. Scott, M. D., an analysis of 210 cases of various infections which was published in *Archives of Surgery* for May, 1925, is of especial interest. In it the authors tell us that experiments have shown that the drug can be injected into the same vein repeatedly without causing irritation. Human beings have in many instances been injected with doses of 5 mg. per kilogram of body weight without apparent injury. They have in several instances used doses of 6, 7, and even 8 mg. per kilogram. In the larger doses reactions are usually characterized by nausea, vomiting, and frequent stools.

"* * * Careful studies of the urine of patients who received large doses sometimes showed slight albuminuria and occasionally a few casts, but in all cases studied by us these have disappeared in a few days * * *.

"The first case that proved the value of mercurochrome-220 as an intravenous germicide was that of a woman who came to us with bilateral pyelonephritis due to *Bacillus lactis-aerogenes*. Within 24 hours after an intravenous injection of 5 mg. per kilogram, the urine was sterile and the patient cured. This is the first positive demonstration of a *therapia sterilisans magna* with mercurochrome-220."

Owing to there having been so many brief and inaccurate reports on the use of mercurochrome-220 in the recent literature, Doctor Young and his associates have been impelled to publish the full and carefully prepared report of which this is a brief abstract. The report is compiled from the records of their own clinic and those of other physicians of repute. Almost without exception the reports are favorable and indicate enthusiasm on the part of those who have used the drug.

Report is made of 57 cases of septicemia, 2 of which are of urinary origin, 12 of traumatic or post-operative origin, 6 of throat infection, 2 of ear and lateral sinus, 6 following osteomyelitis or abscess,

20 of puerperal infection (12 successful), 7 of endocarditis, 2 uncertain.

Some of these patients received only one injection, some two, some three, and others more. None of the cases ending fatally received two injections of 5 mg. per kilogram, the recommended dose. It seems probable that in these cases the treatment was started too late or was not pushed vigorously enough. In cases of septicemia, doses of 5 mg. per kilogram should be used and repeated as often as necessary or as possible.

Twenty-two cases of pneumonia are reported with three failures, one of these being moribund when treatment was started.

The authors continue: "It seems fair to deduce that with large and, if necessary, multiple doses (5 mg. per kilogram each) a large percentage of recoveries may be expected in certain pneumonias, particularly in children. The number of adult cases is still too small to warrant positive assertions. In children the results appear to be really brilliant."

Among the genitourinary infections (nongonorrheal) treated, there were four cases of retroperitoneal and perinephritic infections, three of which were cured, and one greatly improved. Twenty-three cases of pyelonephritis were treated; 17 recovered and 6 were not improved. In four cases of cystitis and prostatitis all recovered. One very severe case of chronic phagedenic chancroidal infection was given five intravenous injections of mercurochrome-220 and was cured.

"With eradication of the primary focus of infection, pelvic lavage and intravenous mercurochrome we believe that the great majority of pyelonephritic cases can be sterilized. Combined treatment is therefore indicated."

Thirty-seven cases of gonococcus infections are included in the report, some of which are those previously reported in this BULLETIN by Potter and Redewell. Twelve of the 26 cases of urethritis were cured.

"Apparently gonococcus urethritis may in some cases be rapidly sterilized, and all symptoms of disease disappear after several intravenous injections of mercurochrome-220, but doses of from 4 to 5 mg. per kilogram should be employed to secure results. With smaller doses reaction may be avoided, but the patient may not be cured.

* * * * *

"It seems probable that gonococci may be eradicated from the tissues and yet live and multiply in the urethra. On this account antiseptic injections should also be employed. In dealing with this dread malady every valuable weapon of offense should be used."

Among 12 cases of gonorrheal arthritis, 5 are apparently cured and 4 greatly improved. It seems probable that the four cases received insufficient dosage.

Five cases of multiple arthritis (nongonorrheal) were treated with apparent relief in all cases.

Mercurochrome-220 has also been used in the treatment of skin diseases—eight cases of erysipelas with eight cures.

Furunculosis and carbuncle in six cases responded rapidly and completely.

Eighteen cases of cellulitis, skin abscesses, and gangrene are reported. In 15 of these the patients have been markedly improved by the use of mercurochrome-220.

Two cases of severe pemphigus were treated. Both showed remarkable improvement, but relapse occurred in one.

Thrombophlebitis has been treated successfully, but the number of cases is too small to justify any conclusions.

Seven cases of typhoid fever were given intravenous injections of mercurochrome-220. All recovered and the length of stay in hospital was materially reduced. The authors suggest that possibly enteric-coated mercurochrome pills may be found to be as satisfactory as intravenous injections.

Two cases of acute anterior poliomyelitis were treated and recovered without paralysis.

Two cases of epidemic encephalitis recovered.

Six cases of meningitis showing streptococci or pneumococci were treated. Two recovered.

One case of Rocky Mountain spotted fever recovered.

Report of one case of bubonic plague treated by Doctor Rucker of the Public Health Service is given. The patient recovered. How much part the mercurochrome-220 played in the recovery of this case can not be stated, but, concerning the use of mercurochrome in plague, Doctor McCoy, of the United States Public Health Service, says: "Antiplague serum is of so little worth and so uncertain in its action that I believe that mercurochrome-220 had more influence in this case than the serum."

Fourteen cases of plague (13 pneumonic and 1 bubonic) were treated in Los Angeles General Hospital with mercurochrome-220. Only two recovered, but life was prolonged in several other cases, and it seems probable that insufficient treatment was given.

One case of scarlet fever with rapid recovery, three of tuberculosis, all of whom received benefit, and four cases of peritonitis, two of whom recovered, complete the series.

Doctor Young and his associates give a very complete analysis of the dosage and reactions in the cases treated in the Brady Urological Institute, as well as in the outside cases in which these data were

given in full. Suffice it to say that nausea, vomiting, and diarrhea occurred in some cases following the injections; casts appeared in the urine soon after treatment in a few cases, but the urine soon became normal; chills of varying severity occurred in about 45 per cent of the cases; the temperature in some cases was at first increased, but soon fell; in other cases, there was no initial rise, but a rapid fall. Stomatitis developed in about 20 per cent of the cases. Among 72 cases treated outside of the Brady Urological Clinic, 66 $\frac{2}{3}$ per cent showed no reaction or a slight or moderate one, in 29 per cent the reaction was marked and in 4 per cent it was very marked.

Conclusions reached regarding reactions follow:

"By giving small doses of mercurochrome (3 mg. per kilogram) as a rule practically no reaction is encountered after the first injection, and two or three more can usually be given before the gums become sore and slight stomatitis develops * * *. When injections of 4 or 5 mg. per kilogram are given, especially in the presence of fever, a marked febrile reaction, followed by a marked drop in temperature, usually occurs. The most uncomfortable reactions * * * are nausea and vomiting * * *. It is interesting to note that when a second or third injection of equal size is given the reactions are almost always less and that not infrequently there is no reaction following a dose which produced a very severe reaction at first.

"The whole subject of reactions can therefore be viewed with little concern. In order to give desperate or very severe cases adequate dosage, it is necessary to inject at least 4 or 5 mg. per kilogram, and in so doing one may expect a certain number of marked reactions. Although producing great discomfort, these are transitory in character and apparently lead to no permanent damage. The severity of the reaction (especially febrile) may even play an important part in the elimination of the infection. They do not cause definite nephritis."

Two reports of death following intravenous injections of mercurochrome are given. In one, death was probably due to embolism. The other was a severe case of pemphigus who developed anuria and died within 24 hours.

The technic recommended in this paper is as follows: Injection of a 1 per cent solution made up with freshly distilled water from the granular form of mercurochrome-220 soluble. Warm water may be used, but the solution should not be boiled, as disintegration may occur. Injection is made slowly, as in other intravenous medication.

Conclusion: "We realize that in thus presenting a new form of therapeutics in such a varied series of cases we will encounter much criticism and perhaps be accused of presenting a penacea for every infectious disease. We are quite willing to meet this criticism with

the series of cases here recorded, which we believe justifies the final assertion that in mercurochrome-220 soluble intravenously administered, a really remarkable addition to therapeutics may be claimed. It is a drug the usage of which in a great variety of septic conditions seems justified. Further progress toward a 'therapia sterilisans magna' has been made."

GUARDING THE HEALTH OF OUR PRESIDENTS

The leading article in the May, 1925, number of *Better Health* (San Francisco) bears the above title and is contributed by Surgeon General Rixey, United States Navy (retired). It gives an interesting and valuable insight into the multifarious duties, cares, and privileges that fall to the lot of the doctor who occupies the position of official physician to the White House.

No one is better qualified to speak with authority on this subject than Doctor Rixey, who filled the position for more than 10 years with credit to himself and with entire satisfaction to his illustrious patients—Presidents McKinley and Roosevelt.

Doctor Rixey says: "The health of the President of the United States and of his immediate personal and official family is of so much importance to all our people, and indeed to the whole world, that I am glad in my declining years to express * * * my views on this subject, formed after an experience of over 10 years as the official White House physician of two of our Presidents. I had the responsible honor of serving Mr. McKinley from 1898 to the date of his death in 1901 and Mr. Roosevelt from that date to his retirement from office in 1909. This experience gave me increased interest in the health of all our Presidents since that period.

"Everything concerning the President's health affects society and business in a very material way, and the thousands of letters and telegrams asking to be advised whenever the President is even slightly sick and offering all kinds of advice and all varieties of prescriptions for the guidance of the official physician would take up more of his time than could be spared. * * * And just here let me say that the White House physician should clearly have it understood that he will give out nothing in regard to the health of the occupants of the White House except through the President's secretary, and then only when it is of such importance as to demand bulletins signed by the official physician and consultants, which are always given to the press through official channels. In this way the public, which has a right to the information, is kept advised in no uncertain way, and nothing is given out that might unduly alarm or affect social or business life."

As Doctor Rixey shows us, the paramount duty of the White House physician is to safeguard the health of the President himself, but he must also care for and watch over the health of the members of the President's personal family and his official family, as it is easy to see that whatever affects them might also affect him.

That the office is no sinecure is shown by Doctor Rixey in a few reminiscences of his service. Mrs. McKinley was a chronic invalid and President McKinley a devoted husband; therefore her condition was always a source of great concern to him. So great was the President's concern for his wife that he was always anxious to cancel any tour he was about to take rather than have her run any risk to her health. The responsibility of deciding rested upon the official physician and was no light one.

After the death of President McKinley, "met—as the official report reads—in line of duty while receiving the people," Doctor Rixey was directed by President Roosevelt to continue his duties as White House physician. With the change in administration came also great changes in the duties of the physician. As the author tells us, "In the professional care of President and Mrs. McKinley I had a patient who, on account of his invalid wife, refused to leave her to take proper exercise, and, indeed, the only exercise he did take was short walks and drives usually in a closed carriage. The result was that he had poor resistance to disease or injury, as was proven when stamina was needed following the fatal shot." President Roosevelt and his family were very different types. All were devoted to outdoor life and all were in good health. Because there were six children in the family, Doctor Rixey fitted up an emergency outfit in the White House to care for children's diseases or accidents, and found it very useful. It was also a part of the physician's duties to accompany the President on his strenuous trips—hunting, riding, walking, etc.—and his services were frequently required.

Both Presidents with whom Doctor Rixey served consulted him in regard to important health appointments, and through his close contact with the White House he was able as Surgeon General to secure many needed reforms in his own corps and to be of assistance to the Army and Public Health Service.

President Taft chose an Army medical officer to be his official physician; President Wilson came back to the Navy and appointed Past Assistant Surgeon (later Rear Admiral, Medical Corps) Grayson; President Harding chose his own family doctor; while President Coolidge has Major Coupal of the Army as White House physician.

Doctor Rixey suggests the following rules as desirable to be carried out by one filling the responsible and arduous position of President of the United States: "Ten minutes setting-up exercise before

breakfast, one hour's walk before going to his office, from one to three hours' exercise in the open air before dinner at 8 o'clock."

In addition he makes a timely appeal to the American people to refrain from requiring the President to shake hands with the hundreds and thousands of visitors who flock to his receptions and offices. Shaking the hands of this multitude is a great tax on the energy of the President, and he can ill afford to waste any energy upon which his legitimate duties are a sufficient tax.

In conclusion, the author says: "As to the White House physician, he must always sink his own interests in that of the health of the President and of his personal and official families. In other words, his desires, pleasures, and all other duties must be subordinated and devoted to this special service."

CARE OF NARCOTICS IN THE NAVY

RELATION OF NAVY PERSONNEL TO THE NARCOTIC QUESTION

The Navy is not intimately concerned with the question of drug addiction per se, as drug addicts can not very well remain undetected in the service. Special care is taken to prevent the enlistment of drug addicts, as may be gathered by reference to paragraph 1404, Manual of the Medical Department. This paragraph particularly describes the symptoms by which drug addicts may be recognized, for the guidance of medical officers on recruiting duty. On being accepted a recruit is sent to a training station, where he is kept in detention under the observation of experienced medical officers for three weeks before he is allowed to mingle with the other personnel in training. Upon completion of their training period, recruits are generally sent to sea. When they arrive on board ship they are again in a measure segregated by being placed in training divisions under the close scrutiny of officers who are charged with the duty of determining the individual fitness of each such recruit. With such precautions in force it would hardly seem likely that any abnormal person could escape detection, but there is always the possibility that a secretive, cunning addict might for a time escape detection, but not for long. The men on board ship are, of course, obliged to live in close contact. For sanitary and disciplinary reasons their clothes, bedding, and personal effects are inspected at frequent intervals. This would make it very difficult for any drug addict. The intelligent men in the Navy to-day would not knowingly hazard the presence of a drug addict who would constitute a danger in the handling the complicated machinery and great guns of a fighting ship. It has been the experience of Medical Department personnel generally that shipmates are not slow in bringing to the attention of

the medical officers suspicious actions on the part of an individual. This is quite a natural protective attitude. The householder would not knowingly harbor a pyromaniac.

THE NAVY'S DUTY IN REGARD TO NARCOTICS

The Navy's duty in relation to the sociological aspects of drug addiction is therefore practically limited to the conservation of narcotics to the end and that their use shall be restricted to legitimate purposes and not fall into the hands of unauthorized persons. Medical officers of the Navy are of course exempt from most of the provisions of the Harrison Act. Their duty as exempt officers is quoted from the Harrison Act and published to them in paragraph 756, Manual of the Medical Department, United States Navy. In the same manual there are instructions in regard to safeguarding narcotics for the guidance of the medical officers afloat, medical officers ashore, the executive officer of a naval hospital, and other persons included in the personnel of the Medical Department. Being exempt officials, naval medical officers are required by article 46, Regulations No. 35, issued by the Treasury Department, to keep an accurate record of all narcotics purchased or issued by them, which record must always be available for inspection by internal revenue officers.

HOW THE NAVY SAFEGUARDS NARCOTICS

Article 1145, Navy Regulations, states: "Narcotics, alkaloidal poisons, alcoholic beverages, and poisonous chemicals shall be kept in separate lockers in the storeroom and in the dispensary. These separate lockers shall be kept under lock and key and the key shall always be in the custody of an officer." For the proper safeguarding of narcotics the Navy regularly provides, as listed in its standard stock catalogue, metal safe lockers in three sizes. They are provided with safe combinations and are used, respectively, for narcotics in medical storerooms of larger vessels, for dispensaries, and for dispensaries or medical storerooms of small-crew vessels. In larger hospitals Navy standard pay officers' safes are generally used for storing narcotics. From the above it will be seen that while Navy regulations require narcotics to be kept under lock and key, they are in actual practice kept in safes equipped with combination locks.

The Navy has always been alert to the necessity of detailed administrative directions in regard to narcotics. The following is quoted from a circular letter issued by the Bureau of Medicine and Surgery, May 11, 1916:

"2. The bureau has reason to believe that the outside organizations promoting this business have made overtures to persons in the

naval service, and directs that the strictest possible custody over narcotics be exercised both by keeping the same in secure lockers apart from other stores, and by such accounting for all expenditures that thefts even of fractional parts of packages or containers may be immediately known after frequent inspection."

In their official capacity medical officers find it necessary at times to prescribe narcotic preparations for out-patients connected with the Navy. Under such conditions they need only write a prescription on paper having official letterhead. This bureau has, however, notwithstanding the exemption of its officers from registration, encouraged its officers to register in order to facilitate accounting for narcotics, and it is customary for medical officers who are in attendance on officers and officers' families living outside of naval stations to register with the local internal revenue collector.

STRATEGIC NARCOTIC RESERVE

Preparedness demands that military and naval establishments should carry a reasonable reserve in such essential drugs as are obtainable only by importation in time of war. Opium and coca derivatives would seem to come in this class. The Navy, has, however, disregarded cocaine as a vital item in time of war. While it would be justifiable to carry a definite reserve in opium preparations as well as in the derivatives of opium, the Navy has not been unmindful of the sociological hazards connected with such reserve. It has therefore adopted the policy that it considers only morphine and codeine of enough vital importance in war to justify a reserve. The solution of this problem has been sought with a view to utilizing narcotics already on hand and segregating them for reserve in order that the actual amount of narcotic drugs within the United States might not be increased.

An analysis was made of the amount of each drug used by the naval shore stations during the year 1924. Special attention was given to narcotics. It was found that morphine sulphate crystals in 5-gram bottles was not used by all of the hospitals, but that a number of hospitals confined their use of morphine to hypodermic tablets. It has accordingly been decided to have all morphine sulphate crystals returned to our supply depots in order that these crystals might constitute our strategic reserve from which we might have manufactured hypodermic tablets of morphine sulphate and tablets of codeine when necessity arises.

It has been a continuous policy with this bureau to limit the variety of narcotic preparations and derivatives for use of the Navy. The Navy does not use heroin and will not in the future use morphine except in hypodermic tablets. It will be apparent that this will

simplify accounting for narcotics and lessen hazards which are always incidental to the storage of narcotics, especially in the vicinity of large cities where criminals congregate.

EARLY DAYS ON THE ISTHMUS

In the June, 1925, number of *The Military Surgeon*, Capt. D. N. Carpenter, Medical Corps, United States Navy, has given an interesting account of the experiences of naval medical officers on the Isthmus of Panama under the heading "Reminiscences of early days on the Isthmus." In it he brings out more clearly than has been done before the importance of the work done by officers of our own corps in the early days of American occupation, before the Army arrived upon the scene, and while making no special plea for recognition of the work done brings to mind the fact that no credit has ever been given to the earliest workers along sanitary lines and study of tropical diseases in this, at that time, pest-ridden part of the world. The author, together with four other naval medical officers, accompanied the marines in their first occupation early in 1904. Up to this time "Chagres fever" was the name given to all the deadly and little-understood fevers of the Isthmus. It was the work of these medical officers of the Navy which showed that some of these cases were malaria, some yellow fever, and some only dengue, and that they could be differentiated readily by blood examination. Their work led to the discovery of the leucopenia and relative lymphocytosis now considered such an integral part of dengue.

As to quinine prophylaxis, Doctor Carpenter says: "The value of prophylactic doses of quinine was studied with men compelled by military discipline to take 5 grains daily. It was noted that the quinine thus given did not prevent infection, but it did delay and mask the symptoms of an attack and made it more difficult to find the parasite * * *. As a result of the study of several hundred cases of malaria on the Isthmus it was noted that only one-third were of the estival or malignant type and two-thirds benign tertian. The opinion of Stephens and Christopher, of the Indian Medical Service, was confirmed that for accuracy of diagnosis stained specimens should always be used rather than fresh blood * * *. The differentiation of estival infection by Marchiafava and Celli into 'subtertian' and 'quotidian' types was confirmed in several selected cases by withholding quinine treatment."

The remainder of the article is made up of a narrative of the author's personal experiences, which were varied and of much interest. He concludes as follows:

"Naval medical officers had their share in the pioneer work of investigating the prevailing diseases of the Isthmus and in the early

efforts to eradicate them. Determining that 'Chagres fever' was usually malaria or dengue made that 'bugaboo' less dreaded by everyone. The finding of leucopenia and relative lymphocytosis as an additional means of diagnosis of dengue and eliminating a blood parasite similar to the piroplasma as a cause was our contribution to the general knowledge of that disease.

"So far as is known, hookworm as one cause for the inertia of the canal workmen was first found by us. The 'chicken clinic' gave an idea of the prevailing diseases among the natives, and a malarial survey by Surgeon Bell indicated the incidence of infection which proved of value to Doctor Gorgas in his great work of sanitation on the Isthmus."

It is with pride and pleasure that, even at this late date, we are able to point to the service rendered by our own officers in laying the foundations for the great work which followed.

THE QUESTIONNAIRE FORM OF REPORT

It is not very unusual when a number of naval medical officers gather together for the conversation to turn to the subject of "paper work." Often all will agree that there is too much of it in the Navy and that not enough initiative is left to the individual in making his reports of routine or unusual occurrences. Occasionally, however, there is found some one in the gathering who will defend the policy of the bureau in requiring so many and such explicit reports. Upon investigation it will very likely be found that the defender is one who has had duty in the bureau in connection with the handling of reports or who has attempted at some time to compile useful statistics from reports which have been made out in the various forms considered suitable by the individual medical officers. Such a person will realize that in requiring uniform reports and answers to definite questions the bureau has no desire to squelch the initiative of the reporter nor to prevent him from bringing out any points he may consider of importance in connection with the occasion of the report. Abundant opportunity is given for this under "Remarks," or, if it is considered advisable, the medical officer may spread himself as much as he desires in a letter to the bureau.

The Statistical Division and the Division of Preventive Medicine make use of all reports for very practical purposes. Unless the reports are uniform in giving the desired data, they can not be used in tabulations, or, if they can be used, an immense amount of labor is required to "dig the meat from the shell." This is the real reason for the large number of questionnaire forms which the bureau has sent out to the service in recent years, and it is believed that when

medical officers realize that uniform reports are of great value for statistical purposes, while reports in varied forms are of little or no value, there will be less of a disposition on their part to criticize and condemn the bureau for attempting to stifle their initiative by requiring them to use the blank forms for so many purposes and on so many occasions.

UNITED STATES PHARMACOPŒIA, TENTH

The chairman of the Committee of Revision of the Pharmacopœia of the United States of America, 1920-1930, has requested that the following notice be published:

Word has been received from the Bureau of Chemistry that they are now prepared to supply standard substances conforming to the biological assay requirements of the United States Pharmacopœia, Tenth. Manufacturers are invited to make application and to indicate the approximate amount of material they may desire to receive from the bureau. All who desire such standard substances against which to check their biological assays should make application at this time, addressing their communication to the Bureau of Chemistry, Department of Agriculture, Washington, D. C.

SANOCRY SIN

Among the news items in the Boston Medical and Surgical Journal for June 11, 1925, is the following:

"Preliminary tests have been given the salt of gold and serum treatment for tuberculosis by the United States Public Health Service. It has been announced that the Public Health Service must for the present withhold its approval. The treatment originated in Denmark. Further tests are now being conducted on a new basis, but no conclusion has been reached. Salt of gold, technically known as 'sanocrysin,' can not be sold in the United States until it receives Government approval. Thirty calves suffering with tuberculosis have been given the treatment without benefit, according to Dr. George W. McCoy, who directs the experiments. Doctor McCoy states that Danish physicians have admitted that death has resulted in some cases in which the treatment has been given. British scientists are not yet ready to recommend the treatment."

NAVY NURSE CORPS

FROM HAREM TO HOSPITAL IN EMANCIPATED TURKEY

By MARY H. BETHEL, Chief Nurse, United States Navy

An allied fleet swung at anchor in the magnificent harbor of the sultans, where the greenish-blue waters of the Bosphorus meet the blue waters of the Marmora and the Golden Horn, which flow gently down from the well-known "sweet waters" of Europe.

In this country of unrest and upheaval, where wars and suffering untold were ever present, we lived, worked, and wondered. We heard rumors of the Greek advance through Anatolia; we heard tales of a fleeing Russian army, but what was our mission to be and where would it finally lead?

In the early dawn, as the mist melted out of the Golden Horn, making a fairy land of all Stamboul with its towering minarets and domes silhouetted against the sky, we saw a fleet of more than a hundred Russian ships laden with men, women, and children. The vessels moved slowly down the beautiful Bosphorus whose shores have been the playgrounds of the sultans since before the days of Mehmed Ali. From the decks the exiles watched the marble palaces, the land of the elusive charm with its rolling hills and happy valleys, its gorgeous gardens and bubbling fountains, its groves of stately cypresses and stone pines outlined against the Asian sky. Past ruined water-side forts and the castle of Anadoulou Hissar, past bays and tempting points, the great fleet moved. By the summer embassies at Buyuk Dereh, where the Russians once were so luxuriously quartered, and then past weather-beaten, wooden-housed villages, these Russian sufferers floated, driven from their own land to enter a new phase of life in exile. What that life was that the tide of the Bosphorus carried them to meet only we who were there to see can realize. In a strange and warring country the fates had put them down, probably the most altruistic people in the world.

The ships dropped anchor in the bay of Moda, and the streets of Constantinople were soon flooded with thousands of men in gray military cloaks—a defeated army, these men of Wrangel's forces. The Russian language was heard everywhere, and of the Americans they spoke. "They are here, the people of America, that great distant country of which we often dreamed in our early youth."

It was five years ago that all this happened, when, under the command of Rear Admiral Mark L. Bristol, United States Navy, our destroyers in Turkish waters were rushed to assist in the evacuation of noncombatants, women, and children from Sevastopol, Novorissk, Baytoun, and other villages along the coast of the Russian Black Sea. Escorted by ships of our Navy and of our allies, a mass of struggling humanity came to us in this hour of their greatest trial. Separated from their country, their homes, their children, and all whom they loved, packed like cattle upon dirty Russian ships, without food, water, or clothes, with disease rampant, and filth everywhere, these unhappy people were finally landed on the island of Proti, one of the Princess group off the coast of Asia Minor. After crowded living quarters, days of exposure, and improper food the American Red Cross with its small emergency hospital could not cope wholly with such woeful conditions of sickness and destitution. With the organization of the Medical College for Girls, the long-cherished dream of its founder and president, Dr. Mary Mills Patrick, the influx of Navy personnel, and the frightful refugee situation to be handled, the American colony at Constantinople deemed it advisable and necessary to establish an institution where our Father's sick could be nursed—an institution where American ideals and American helpfulness could be demonstrated in an hour of urgent need. Thus the Stars and Stripes were unfurled in the land of the Crescent, to wave over a work that is now playing an important rôle in the making of a new nation.

The hospital is situated in the midst of a beautiful garden inclosed by a vine-covered wall which hides from the curious passer-by the fountains and secret underground passages which are said to have led to St. Sophia in the days of Constantine the Great. The building, three stories high, was once a favorite harem and occupied by a pasha in former days. It is built on a hilltop at Tcharchou Capou, meaning "entrance to the bazaar," in Stamboul, so rich with stories and legends. Near by is the "Triumphal Way," the "home stretch" of a once famous Roman road, and the hospital entrance is on the Divan Yolou or Street of Council, which owes its character to the tombs and cemeteries that border it.

In spite of the bawling, yelling street vendors seeking customers for their wares it was an ideal site for a hospital. The large airy rooms, with rivers of sunlight pouring in from all sides, made a good place to care for our Navy sick as well as our other patients.

The old Turkish palace is an expressive bit of architecture, with its many latticed windows and large marble halls running through from garden to street, and with its great double staircase leading up to other spacious halls above, with large sunny rooms opening

from each side. For their beauty these great rooms ablaze with sun depend upon their windows, their beautiful proportion, and the coloring of their decorations. Marine or lake scenes, flowers, and strips of gilded molding arranged in simple design give distinction to the interior of a Turkish building, while through the latticed windows the view carries the vision far out over the waters of the Marmora or across the weird and picturesque city of the Byzantine.

From our garden minaret, where we often sat at twilight, we heard the muezzin call the faithful to prayer, while we "infidels" idled away our time watching the primitive community streaming into the mosques to give thanks to Allah. Regulated by the sunset, these calls in summer came rather late, and often the voice of a "blue jacket" would ring out in the stillness "Pipe down, Khoja, pipe down. Don't you know it's two bells?" Can those boys realize what they contributed to the color and glory of that old historical building, no longer a haunt of idle pleasure seekers, but the expression of the humanitarianism of the American people?

What a pleasure it was to take care of those men of our Navy in such an artistic setting as old Stamboul, the real city of the Turks, with its fascinating yet undiscovered history. Stamboul is a city so mysterious that you can live in its environment and atmosphere for years. You can learn the language of its people, read its literature, yet you can never penetrate the mystery of its inmost soul. Gay with color and delight for the European, the old, cobblestone streets, over which victorious armies have marched, wind in and out, climb hither and thither for no "rhyme or reason" that a westerner can grasp. Arched with wisteria or grapevines, these old streets, with their dilapidated houses, their old stone mosques, their unkempt cemeteries, their underground cisterns and dungeons, entice the foreigner to search blindly for the mysterious end of some tremendous adventure.

Stamboul would not be Stamboul without its numerous coffee houses, which are encountered at every turn. Hanging out over the Marmora, the Bosphorus, and the Golden Horn, or tucked away in some happy oasis of trees and water, the coffee house is indeed an essential part of the national life, inviting an ever endless chain of meditative male citizens, who with turban and fez sit cross-legged for hours at a time, sipping black Turkish coffee and smoking the inevitable hubble-bubble, deep in contemplation.

A feature of Stamboul is the bazaar, the tourists' great delight. Extending over a large territory walled solidly on all sides, except where it is broken by the great iron entrance gates, this vast dome-covered exchange possesses an interest that can never wane. Over piles of beautiful rugs being sold at auction, through long, gaily decorated arched avenues of brasses, books, silks, beads, perfumes,

silverware, and "what not," visitors ramble on and on, stopping to buy here, to bargain there, until at last the famous "Bezesten" is found. This Bezesten bazaar, walled within a maze of passages and avenues and the last relic of Byzantium, has a fascination which holds one spellbound. It is here that the shopkeepers sit cross-legged in robe and turban on rows and rows of shelves or steps, and each has before him his case inlaid with mother of pearl, in which his wares are kept. Rare old things these merchants sell, and the dust-laden rays of the sun shine in through the small barred windows in the dome above, giving a richness to the colors and a magic to the whole scene which makes this oriental market place a scene beyond the powers of human comprehension.

Proud in decay, Constantinople, with all her old mosques, her ruins, her great fire-swept areas, and picturesque peoples of many tongues, is a metropolis which carries us back to the days of the Byzas of Megara, who founded Byzantium about 658 B. C. In the heart of all this color and past glory, in the midst of an old "worn-out-at-the-elbow and run-down-at-the-heel" city, overlooking the azure blue of the Marmora Sea and the purple hills of Asia, we gazed out of the latticed windows of our wards. And we saw, too, the village of Scutari, which has remained very much the same since the days of the Janizaries. Its narrow, steep streets climbed sometimes by steps over the hills to the cemetery above. Scutari has its vine-covered houses, with grilled windows, its beautiful gardens and fountains sparkling in the sun, its picturesque mosques, and coast line where swift moving graceful little caiques glide through the waters of the Bosphorus, making a scene of never-ceasing joy. "City of Gold" the village has been called, because the sun's rays give a golden gleam to the windows. Perhaps of all places in the Near East it has the greatest charm for the American nurse, for here in another terrible struggle, in a hospital housed in barracks, Florence Nightingale first proved to the world the necessity of scientific training for the nurse.

And it was here in this cradle of nursing that we Americans, at the close of the World War, to meet the urgent need for help through the period of reconstruction, established not only a hospital but a school of nursing, which will go down in the history of humanitarianism as The American Hospital School for Nurses. Here the young women of the Near East, especially the young women of reborn Turkey, are given an opportunity to receive a nursing education as complete and thorough as the training received in the best American training schools in the United States and in accord with the standards set by the League of Nursing Education. To promote this enterprise in a land where the education of women was looked upon with scorn was no easy task. But

the conditions of the city, with its masses of disease-stricken people, its wounded men, and famished refugees, worked in our favor in convincing the ignorant, superstitious people of the significance and importance of professionally trained women to carry on. To the training school came girls of all the nationalities found in the Near East. Diverse to each other were their temperaments, dispositions, and manner of living. They came from homes where they had been guarded and sheltered to take up a revolutionizing and evolutionizing work in the history of the women of the East. Already two young graduates of the training schools have become great forces in influencing society to accept the new standard of the modern woman, and, with Dr. Safi Ali, the first Turkish woman physician, this little group is struggling to give to the women of the Near East, through the Turkish red crescent, what Florence Nightingale gave us.

Of the hospital itself, a word more must be said. During the first four years of its operation it included, as well as the nurses' training school, a course of medicine and surgery for women students, which in 1924 was taken over by the Turks to be continued in connection with the well-equipped native university at Haidar Pasha. The patients cared for in the hospital were not only officers and men of the Navy and members of the American colony, but the public at large, irrespective of race, color, or creed, and in its management was kept free from control by any political, religious, or other special influence, so that both in the wards and in the immense out-patient department the greatest service to all classes of people could be rendered.

To-day no allied fleet swings at anchor in the harbor, no foreign power holds sway over an alien and weaker race, instead a new generation is coming into power, a younger generation with ideals founded on the democratic traditions of the West, and in this movement the Turkish woman, inspired largely by the women of America, will have an equal if not a major part.

MARIA ROBERTO

Not long ago a letter from Guam told of the grief which came to the people of the island when it was discovered that Maria Roberto had developed leprosy. The following excerpts from an article entitled "Maria Roberto: A Tribute," written in 1922 by Miss Della V. Knight, who was chief nurse at Guam in 1914, tells of the high esteem in which Maria Roberto was held.

"* * * The medical officers who were ordered to Guam immediately after this island became a possession of the United States

found the natives in great need of medical and nursing care. Overcoming what seemed to be almost insurmountable difficulties, they established a hospital, and native women were instructed in the nursing care of the sick women and children. First among the women who received this instruction was Maria Roberto.

"Maria Roberto was born on the island of Guam about 45 years ago. The world to Maria is the small island upon which she lives, and she being of a practical nature, I doubt whether she has ever strayed from this land, even in fancy. * * * Her keen mind, well-developed sense of honor, all the gentleness and loveliness of the native, with a great desire to do for others, have made her an outstanding and valuable person on the island.

"When I reported for duty in Guam, August 27, 1914, I found that the principal duty of the chief nurse of the Navy Nurse Corps at this station was the instruction of and the responsibility for the native nurses. In a short time it became evident that in order to give the necessary nursing care to the native women and children who were patients in the hospital and to provide a nurse for the dressing stations at villages distant from the hospital more native nurses were needed. It seemed impossible to supply this need with desirable material. Upon inquiry I learned that many of the better class of native girls were willing, even anxious, to do this work, but there was an objection on the part of the parents. Guam having been a Spanish possession, some of the Spanish conventions were still adhered to by the better-class natives, and parents would not allow their daughters to leave the confines of their homes unchaperoned. Not being able to, nor having a desire to, change these conventions, it became clear to me that to provide for what I knew to be a great need it would be necessary to first obtain a chaperon for the native nurses. Having heard much about Maria Roberto from the nurses, there was no doubt in my mind that she was just the person for the place. I sent for Maria. She came to see me at the hospital and told me she could not accept my offer, as she had an adopted child to care for and the pay was not sufficient. After discussing the matter with the commanding officer, he decided that out of the fund for the care of sick natives Maria was to be paid a sufficient amount for her needs and the needs of the child. Maria being well known on the island, and the fact that she was engaged as 'official chaperon' for the native nurses, removed the objection of the parents to the extent that it became possible to get the required number of pupil nurses. Maria lived with the nurses, was with them constantly while in the hospital, and when they were off duty and wanted to go home she accompanied them to their homes, where she was relieved of her responsibility by their parents, who returned them to the hospital not later than 10 p. m. This constant super-

vision was accepted very gracefully by these girls, as they were accustomed to it and were very fond of Maria. They also knew that nothing stood between Maria and her duty. * * *

"Maria's field of usefulness is not limited to being 'official chaperon' to the native nurses. Her ability to understand and speak English makes her services as interpreter in the instruction of the nurses and in transmitting orders most valuable. The instruction of the nurses is adapted to their mentality and the needs of the people. A large part of their work is obstetrical nursing, in which Maria is most efficient; and knowing the customs and living conditions of the people, she was most helpful in adjusting the work to their needs. The training of Maria Roberto and other native women, who became quite efficient in the care of obstetrical cases, was a great help to the medical officers in dealing with the question of the midwives of the island. When the commanding officer of the hospital ordered that all midwives pass an annual examination in order to keep their licenses to practice there was much protest on the part of those who could not meet the requirements of the examination, which was entirely practical. This action on the part of the commanding officer resulted in a great decrease in infant mortality and blindness. Again Maria Roberto's influence became evident, in that she knew personally all of the midwives, where they practiced, how they did their work, whether they were meeting the requirements set by the medical officers—and to Maria these requirements were unconditional. She had a way of appearing just at a time to get first-hand information, and well the midwives knew that nothing stood between Maria and her duty. Knowing this, they respected her.

* * * * *

"Service conditions make frequent changes in the Navy personnel at Guam. It is Maria Roberto who remains and who holds together the fabric of the work built up by the Navy nurses."

MARIA ROBERTO—A FURTHER TRIBUTE

By ELSIE BROOKE, Chief Nurse, United States Navy

Since the time the above article appeared until June, 1924, Maria continued to devote her time and loving service to training her countrywomen in the capacity of matron of the Naval Training School for Native Girls at Guam, which position she has held since 1914.

In June, 1924, we discovered that Maria had become a victim of leprosy, adding yet another to the long list of persons in the medical profession who have sacrificed their lives for suffering humanity. When we knew that she would have to be sent to

Manila, for at that time there were no facilities for treating leprosy in Guam, great indeed was the grief of all who were associated with her at the naval hospital and, in fact, all over the island. Maria is a woman of unusual ability and an invaluable matron of native nurses. She possesses the unusual faculty of inspiring love as well as the respect of the nurses under her. She is just but most firm and "allows nothing to stand in the way of duty." Her pupils know this and that her word is law, but it is a law they are glad to obey. Not least among Maria's characteristics is a strong maternal instinct which enables her to take a motherly interest in the pupil nurses.

During the time she was isolated here awaiting transportation to Manila men, women, and children came in crowds to gaze upon her in her tent and to express by their presence their love, sympathy, and reverence. All through this period she showed by her fortitude and wonderful patience under a terrible affliction what a true Christian woman she is.

I shall never forget the crowds of relatives and friends, who constitute a large percentage of the population of Guam, who collected to say, as we feared at that time, a last farewell when she left for Manila. I hope now to participate in a joyful reunion, as a hospital has been prepared for lepers at Tumon, a beautiful spot on the seashore where we expect her soon. I know she will devote the rest of a useful life to easing the burden of her fellow sufferers.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,
U. S. Naval Medical Bulletin,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

MODERN SURGERY, General and Operative, by *John Chalmers Da Costa, M. D., LL. D., F. A. C. S., Samuel D. Gross Professor of Surgery, Jefferson Medical College, Philadelphia; Surgeon to the Jefferson Medical College Hospital; formerly Commander, Medical Corps, U. S. N. R. F., etc.* Ninth edition. W. B. Saunders Co., Philadelphia, 1925.

Da Costa's Surgery is so much a standard in the Navy that the simple announcement of a new edition is about all the review that is necessary. One who understands the physical handicaps under which the author labors will wonder at the thoroughness of the revision and the great amount of labor accomplished. We hope he may be granted many more years of useful work.

One notices among those who have aided in the preparation of this edition the names of Captains Spear and Butler and Lieutenant Pillmore, of the Navy Medical Corps.

This edition is bigger and better than its predecessors. The chapters on bacteriology, antiseptics, and bandaging have been omitted to make room for new matter more necessary in a textbook on surgery.

SURGICAL PATHOLOGY, by *William Boyd, M. D., M. R. C. P. (Ed.), F. R. S. C., Professor of Pathology, University of Manitoba; Pathologist to the Winnipeg General Hospital, Winnipeg, Canada.* W. B. Saunders Co., Philadelphia, 1925.

Pathology ranks second only to anatomy in importance to the surgeon. This has been accepted for generations but interpreted in terms of post-mortem pathology. Recently pathology of the living, as seen at operation, has become recognized as even more important.

Doctor Boyd has prepared a textbook of pathology for the surgeon based on observations made in the operating room, rather than at autopsy. He concentrates on the recognition of pathological con-

ditions in the incipient stage and also summarizes the clinical features so that the relation of pathology to symptomatology is clear.

There are two sections. The first, on general pathology, describes abnormal processes in general. The second, on special pathology, describes disease processes of special tissues and the various regions of the body. He discusses the nature and causation of tumors, chronic appendicitis, nonsurgical drainage of the gall-bladder, and other controversial subjects in a most interesting and impartial manner.

We have seen few books that promise to be so widely useful as this new surgical pathology.

PRACTICAL LECTURES, Delivered Under the Auspices of The Medical Society of the County of Kings, Brooklyn, N. Y. 1923-1924 series. Paul B. Hoeber (Inc.), New York, 1925.

These lectures were given to mark the celebration of the one hundredth anniversary of the society. Their purpose was to deal with the common problems of everyday practice for the benefit of the practicing physician. There are 35 lectures, each by a leader in his field, and most of the lecturers are teachers.

A few of the titles will indicate the practical nature of the book: "The surgical abdomen," by Joseph A. Blake; "The treatment of pneumonia," by Harlow Brooks; "Office gynecology," by Robert L. Dickinson; "The common diseases," by John A. Fordyce; "Common rectocolonic diseases," by Samuel G. Gant; "Diabetes and Insulin," by Louis C. Johnson; "Backache," by W. R. MacAusland; "The chronic diseases of the joints," by Thomas McCrae; "Everyday bacteriology," by W. W. Oliver; "Ectopic gestation," by John O. Polak; "The contagious diseases," by Joseph C. Reagan; "Office orthopedics," by Walter Truslow.

The book will prove a delight to anyone engaged in the general practice of medicine.

THE TEETH AND JAWS, ROENTGENOLOGICALLY CONSIDERED, by *Herman A. Osgood, M. D., Boston, Mass., Roentgenologist, Trumbull Hospital; Consultant Roentgenologist, Gale Memorial Hospital, Haverhill, Mass.* Edited by *James T. Case, M. D., ex-president of the American Roentgen Ray Society.* Volume V. Paul B. Hoeber (Inc.), New York, 1925.

This monographic atlas serves to bring to the physician and dental surgeon a comprehensive study of the roentgenological diagnosis of dental disease. It is, in short, a postgraduate course in X-ray diagnosis of diseases of the teeth and jaws. Written from the standpoint of the medical roentgenologist, the book is concise but complete. The first half deals with the pathology of the teeth and jaws.

while in the second half the author has incorporated a number of excellent roentgenographic studies of diseased dental conditions.

The author emphasizes in the first chapter the mistakes which members of both the medical and dental professions are prone to make. He stresses particularly the fact that, with the dental practitioner, "interpretations are too often based on the wildest empiricisms and are colored by his clinical knowledge of the case" or "that the dentist is far too prone to jump to diagnostic conclusions based on clinical knowledge of the case." This may be true in a sense, although the criticism would seem to be somewhat at variance with the common belief that, for accurate diagnosis, thorough knowledge and experience are required, not only from the roentgenographic viewpoint but also with respect to the clinical findings.

In chapter 3 the author discusses the relationship of the angle of incidence to the film surface while X raying maxillary teeth, and describes a technique which is, in a way, a departure from the usual procedure.

The book is well printed, and the clearness of the illustrations is one of its striking features. It should be very useful to general practitioners of medicine and dentistry who have not had the opportunity to avail themselves of postgraduate instruction in roentgenology.

CLINICAL FEATURES OF HEART DISEASE, by *Leroy Crummer, M. D., Professor of Medicine, University of Nebraska*. Paul B. Hoeber, Inc., New York City, 1925.

This book is of the greatest value to all who are interested in the study of heart disease—students, physicians, and instructors in medicine.

It is written in a manner entirely different from the usual textbooks. The author expresses his own opinions in a most refreshing way. He has carefully followed the title of his book and laid emphasis upon the information which can be obtained at the bedside without the use of unusual or expensive apparatus. Only 18 of the 342 pages are devoted to mechanical aids. In other parts of the book there are occasional brief references to pulse tracings, electrocardiograms, or X-ray findings in cases where the usual clinical methods are unsatisfactory.

The discussion of the heart sounds, normal and abnormal, and the various murmurs is excellent.

Methods of treatment are always in demand. The block method of giving digitalis is described and its advantages outlined.

This book should be read by every naval medical officer.

SERUM DIAGNOSIS OF SYPHILIS BY PRECIPITATION, by *R. L. Kahn, M. S., Sc. D., Immunologist, Bureau of Laboratories, Michigan Department of Health.* Williams & Wilkins Co., Baltimore, 1925.

During the past three years the author has presented in various articles the results of experimental studies carried out in the development of a standardized test for the diagnosis of syphilis by precipitation. This volume presents the details of the development, standardization, and clinical application of the Kahn test. The presentation of this tremendous amount of work in book form enables the reader to correlate the various procedures and get a better grasp of the significance of the test. A complete discussion of the procedures carried out in the development of the reaction is given and a résumé of the clinical and serological studies carried out by various workers is presented in detail. Only the practical application and underlying theories of the phenomena of precipitation are discussed, and emphasis is given to the necessity of observing strict precautions in the preparation of the antigen and rigid observance in technic. This latter factor appears to be dominant throughout the volume and should be greeted with the approval of all serologists. The parallelism of results serologically and clinically with the various modifications of the Wassermann reaction is set forth admirably. Underlying theories involved in the diagnosis of syphilis in the laboratory are discussed and the point of the correct interpretation by the clinician is an outstanding feature. While Doctor Kahn points out that the true interpretation of serologic findings rests with the physician, the responsibility of the laboratory in the diagnosis of syphilis has not been placed in the background. The "quantitative" procedure is given as an indicator of the relative number of "syphilitic reacting substances" in serum and is of particular value in comparing changes produced in the serum by the various chemotherapeutic measures.

This volume presents a comparatively new field to the serologist and clinician for the investigation of the syphilitic.

AN INTRODUCTION TO THE MIND IN HEALTH AND DISEASE, by *T. Waddellor Smith, F. R. C. S. (England), Deputy Medical Superintendent of the City Mental Hospital, Nottingham; member of the Medico-Psychological Association.* William Wood & Co., New York, 1925.

This interesting little volume is very aptly criticized by the author himself when he says in his preface, "My only justification for offering it to the public is the hope that it may stimulate students in studying the many excellent textbooks written on the subject." It is essentially not a textbook on mental diseases, and the reader is not expected to use it as such.

In Part 1 the author outlines in a very concise manner the anatomy and physiology of the nervous system. The differentia-

tion of the autonomic and sympathetic divisions of the vegetative nervous system, as well as the double innervation of internal organs, is set forth in a clear and interesting manner. In the preface the author frankly states that he has followed, among others, the work of Higier. One interested in the vegetative nervous system would do well to study Higier's scholarly monograph on "The Vegetative Nervous System." This monograph is available in the English translation.

The normal emotional tone or affect is brought into play by impulses started in the enteroceptors of the vegetative nervous system. The interoceptors respond to the chemical stimuli of the hormones, from the glands of internal secretion, and the response is of a diffused character and known as feeling. In the healthy body there is an equilibrium between their stimulating and inhibiting effects and we have the normal hormone tone.

Part 2 deals with the classification, terminology, and clinical aspects of psychiatry. The various psychoses are described in a rather short and sketchy fashion, and one misses the abstracts from case histories so commonly met with in psychiatric literature.

On the whole, the book is well written, concise, and without theoretical discussion. While not intended for the neuropsychiatric specialist, it may well serve its purpose as a stimulus to further study of mentation or the functioning of the brain cells from a scientific aspect.

THE CONQUEST OF CANCER, by *H. W. S. Wright, M. S., F. R. C. S.* E. P. Dutton & Co., New York, 1925.

A plea for the reduction of cancer mortality by education of the doctor and the patient to the realization that to "look and see" is far better than to "wait and see." Early operation in the precancerous or very early cancerous stage is advocated. This can be accomplished only by periodic examination and removal of tissue for diagnosis in all doubtful cases. The author believes that the evidence at hand is sufficient to justify the opinion that cancer is due to some form of chronic irritation. The frequency with which cancer follows "chronic gastric ulcer" is noted, and, with many other surgeons, the author believes the only proper treatment for gastric ulcer that has recurred more than once is exploration and some form of operation. The postoperative use of X rays and radium is strongly advocated to prevent recurrences.

SIMPLIFIED NURSING, by *Florence Dakin, R. N., Inspector of Schools of Nursing, State of New Jersey.* J. B. Lippincott Co., Philadelphia, 1925.

Miss Dakin presents her subject in a very simple, acceptable, and accurate manner, which can be understood and grasped by those inexperienced in nursing work. Articles necessary for the various treat-

ments are carefully enumerated. Step by step the procedure is followed, giving a clear understanding and a definite knowledge of the treatment. With the systematically and carefully compiled chapters, explanations, notes, precautions, and simple definitions, this book would be a valuable asset to our native schools of nursing where there is a lack of a thorough knowledge of the English language, and where the student has not had sufficient preliminary education to assimilate the more scientific nursing books. This book shows long and careful thought and gives to the public the basic principles of nursing in a most digestible manner.

INFECTION, IMMUNITY, AND INFLAMMATION, by *Fraser B. Gurd, B. A., M. D., C. M., F. A. C. S., Lecturer in Applied Immunology and in Surgery, McGill University; Associate Surgeon, Montreal General Hospital; etc.* C. V. Mosby Co., St. Louis, 1924.

The chapters are short and to the point. The subject matter shows wide reading of the literature of immunology, together with the presentation of original work. It is not just a rehash of other people's work. There is quite a bit of repetition which adds to the length of the book, but serves to impress the reader with the theory of the writer. The writer makes a worthy attempt to simplify the terminology of immuniological reactions.

THE FOUNDATION OF HEALTH, by *William B. Sharp, S. M., M. D., Ph. D., Professor of Bacteriology and Preventive Medicine in the Medical Department of the University of Texas.* Lea and Febiger, Philadelphia, 1924.

This manual of personal hygiene for students is based upon courses prepared by the author for use in the Junior College of the University of Chicago and for the first-year medical students at the University of Texas. In it the author discusses in a simple manner the hygienic principles that determine health and shows how they affect the body. He discusses the various health fads and warns his readers against such. The many topics are discussed briefly but adequately, and the young man or woman who reads the book understandingly can not fail to be benefited by it.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

ANALYSIS OF DATA RELATING TO ARSENICAL COMPOUNDS USED IN THE TREATMENT OF SYPHILIS IN THE NAVY FROM DECEMBER 1, 1924, TO JULY 1, 1925

The following analysis is made from the data contained in monthly reports of venereal diseases received since December 1, 1924, when medical officers were first required to include in their reports certain information regarding all doses of arsenical compounds administered. The reports studied included all reports for May, 1925, and a majority of the June reports.

The total number of doses of arsenical preparations accounted for by these reports is 24,745. There were 64 severe reactions reported and described, one of which was fatal. The average number of syphilitic patients treated per month during the six months from December to May, inclusive, for which months complete returns have been received, was 1,439.

The following table shows the numbers of doses and the numbers of severe reactions resulting from the administration of neoarsphenamine, arsphenamine, sulpharsphenamine, and tryparsamide of various makes. The doses are summarized as 0.9-gram doses, 0.6 to 0.9 gram, and doses less than 0.6 gram.

	Neo-arsphenamine	Arsphenamine	Sulpharsphenamine
Number of 0.9-gram doses.....	12, 604	-----	18
Severe but not alarming reactions.....	13	-----	0
Alarming reactions.....	14	-----	0
Number of doses, 0.6 to 0.9 gram.....	4, 650	1, 165	366
Severe but not alarming reactions.....	7	1	0
Alarming reactions.....	5	0	0
Number of doses of less than 0.6 gram.....	3, 483	1, 764	164
Severe but not alarming reactions.....	6	3	0
Alarming reactions.....	2	2	0
Total doses.....	20, 737	2, 929	548
Total severe reactions.....	1 58	6	0

¹ Includes 11 severe reactions reported by the U. S. Naval Hospital, New York, for which the details relating to dosage, etc., have not yet been reported. None of these appears to have been alarming in character, and all were possibly due to the cumulative action of previous doses.

Five hundred and thirty-one doses of tryparsamide were given during the period covered by the above table in doses ranging from 2 to 3.9 gram doses without any severe reaction.

It will be noted that severe reactions are classed as *alarming* and *not alarming* in character. Strictly speaking, it is not possible to so classify all the reactions recorded. Unquestionably, in some instances, they were very serious and not really different in character from fatal reactions previously reported. On the other hand, in some of the cases the manifestations were either so mild in character and gradual in onset or the combination of symptoms was such that the reactions could not be regarded as having any great significance so far as evidence of excessive toxicity on the part of the drug employed is concerned.

However, no sharp distinction can be drawn between some reactions which were unquestionably of serious import and some which appeared to be trivial in character or to have resulted more because the patient had syphilis in an active stage than because of any unusual effect of the drug. There were a few cases which may be regarded as examples of subacute arsenic poisoning, and in some of these the question of the toxic effect of the last dose given was complicated by the fact that the patient had recently been given a number of preceding doses, so that the question of cumulative action was involved, as well as possible damage to certain organs which might have been caused either by the disease or by the treatment previously given. Excluding for the moment delayed reactions and considering only those in which symptoms developed almost immediately or within a few hours, if we also exclude, in so far as possible, symptoms which appeared to depend principally upon the fact that the patient treated had syphilis, we come to the conclusion that we are often unable to distinguish any real difference in kind between the mildest and most severe reactions. In degree, of course, there is a difference. Arsphenamine or neoarsphenamine of a given lot number which has proved in practice to be not especially toxic will certainly cause a very severe or even fatal reaction if a large enough dose is given. There are probably many degrees of hypertoxicity in lots on the market, especially of neoarsphenamine, and there probably is a wide variation in the susceptibility of different patients.

The outstanding symptoms in the reactions reported, barring Herxheimer manifestations, were consistent with the symptoms of acute arsenic poisoning described in textbooks on toxicology, pharmacology, and medical jurisprudence. The symptoms bore a striking resemblance to those described in the account of the outbreak of arsenic poisoning which occurred November 10, 1924, at the Elks' National Home, Bedford, Va., from drinking cider which contained arsenic, as described by George B. Lawson, M. D., W. P. Jackson, M. D., and George S. Cattnach, M. D., in the Journal of the American Medical Association July 4, 1925.

In reviewing the case reports of the reactions following the administration of arsphenamine, neoarsphenamine, and other arsenical preparations we see no need for employing such terms as "nitritoid crisis," "anaphylactic," or "anaphylactoid" reactions. A brief statement of the actual manifestations serves our purpose better.

Doubtless the factors which determine in a given case whether or not a severe reaction is to occur are many. There is of course the question of individual susceptibility at the time, which in turn probably depends upon many things. So far as the drug is concerned there is the question of its state of preservation to be considered as well as its condition when released for sale, as evidenced by original tests for toxicity and retest of carefully preserved samples of the lot number in question. Technique of preparing the solution and rapidity of injection into the vein are also considered to be important factors. Some medical officers have expressed the opinion that most of the reactions that occur are due to errors in technique. For the purposes of this study it is not possible to rule out errors in technique. However, we have certain reasons for believing that errors in technique had little or nothing to do with some or most of the reactions discussed below. Many of the reports which described severe reactions showed that other doses were administered at the same time without causing severe reactions.

The 64 severe reactions which have occurred in the course of seven months were reported as follows:

SALVARSAN

	Not alarming	Alarm- ing	Fatal
United States naval hospital, Chelsea, Mass.....	2	1	-----
United States naval hospital, San Diego, Calif.....	1	-----	-----
United States naval hospital, Puget Sound, Wash.....	1	1	-----

NEOARSPHENAMINE

United States naval hospital, San Diego, Calif.....	3	2	-----
United States naval hospital, Parris Island, S. C.....	-----	1	-----
United States naval hospital, Key West, Fla.....	-----	2	-----
United States naval hospital, League Island, Pa.....	-----	2	-----
United States naval hospital, New York, N. Y.....	11	-----	-----
United States dispensary, Guantanamo Bay, Cuba.....	4	-----	-----
Navy yard, Washington, D. C.....	-----	1	-----
Receiving ship, San Francisco, Calif.....	2	-----	-----
Submarine base, Pearl Harbor, Hawaii.....	-----	2	-----
United States naval air station, Pearl Harbor, Hawaii.....	1	1	-----
United States naval torpedo station, Keyport, Wash.....	1	-----	-----
U. S. S. West Virginia.....	3	-----	-----
U. S. S. Galveston.....	-----	1	-----
U. S. S. Orion.....	-----	1	-----
U. S. S. Concord.....	2	-----	-----
U. S. S. Nevada.....	5	3	1
U. S. S. Wyoming.....	2	-----	-----
U. S. S. Cincinnati.....	-----	1	-----
U. S. S. Mississippi.....	-----	1	-----
U. S. S. Denver.....	1	1	-----
U. S. S. New Mexico.....	2	1	-----
Total.....	64	-----	-----

The classification "alarming" and "not alarming" is ours; the organizations reporting did not so classify the reactions.

SEVERE REACTIONS FOLLOWING THE ADMINISTRATION OF NEOARSPHENAMINE OF VARIOUS LOT NUMBERS

Reactions following intravenous injections of neoarsphenamine will be discussed first, and after that the data relating to arspenamine, sulpharsphenamine, and tryparsamide will be considered.

With regard to multiple reactions occurring on the same day, at the United States naval air station, Pearl Harbor, Hawaii, three men were each given 0.9 gram of neoarsphenamine on March 2, 1925. All had had previous injections with neoarsphenamine of a different lot number. Two of the men were given neoarsphenamine of a lot number which we will designate as "A." Both patients had severe reactions, although they were not alarming in character. The third man was given neoarsphenamine of the same make but of a different lot number. He had no reaction whatever. Neoarsphenamine of the same lot number as that involved with these two reactions was reported as causing 8 alarming and 13 other severe reactions in various ships and stations as follows: United States naval torpedo station, Keyport, Wash., 1 severe reaction, not alarming in character; U. S. S. *Denver*, 2 severe reactions, 1 immediate and alarming; United States naval hospital, San Diego, Calif., 2 severe reactions, 1 beginning immediately after the injection with signs of shock; U. S. S. *New Mexico*, 3 severe reactions, none of them especially alarming; U. S. S. *Nevada*, 8 severe reactions occurring on the same day, 3 of which were shocklike in character with signs of collapse; United States naval training station, San Diego, Calif., 3 severe reactions, 1 of which was more or less alarming in character, with nausea and fainting; and the United States naval submarine base, Pearl Harbor, Hawaii, 2 severe reactions, both alarming in character with cyanosis, rapid and weak pulse. It will be noted that the above list includes 8 severe reactions which occurred on board the U. S. S. *Nevada* the same day. These represented about half the doses of lot "A" administered that day. All doses given were 0.9 gram. This lot was withdrawn from service in March, 1925.

Two severe reactions occurred December 31, 1924, at the United States naval hospital, Philadelphia, Pa. These followed the intravenous injection in each case of 0.6 gram of neoarsphenamine of the same make as that involved in the reactions referred to in the preceding paragraph, but of a different lot number, which we will designate as "B." The technique was vouched for and the same care was exercised as with 232 intravenous injections made during the same month without encountering any severe reactions. Neoarsphen-

amine of lot "B" was recalled in view of doubt as to its toxicity, although retest failed to indicate unusually great toxicity for rats.

The United States naval hospital, New York, N. Y., reported 11 severe reactions as occurring during May and June, 1925, following various doses of neoarsphenamine of a lot number which we will designate as "C." Samples of this lot were retested at the United States Hygienic Laboratory and failed to give evidence of high toxicity. The case reports submitted by the hospital showed that the reactions were not of the acute type, but rather suggested sub-acute arsenical poisoning resulting from cumulative action of the drug. On three occasions two patients had symptoms of poisoning resulting from doses administered the same day.

The cases referred to in preceding paragraphs represent all that were reported as having occurred in any one organization in multiple on the same day.

Neoarsphenamines of various other lot numbers were each associated with severe reactions in a number of different organizations. Without mentioning the names of manufacturers, these are all accounted for as follows:

Neoarsphenamine of a certain lot number which we will designate as "D" was reported by the navy yard, Washington, D. C., as causing one severe reaction December 4, 1924, beginning almost immediately after the injection, with chills, cyanosis, and unconsciousness. The U. S. S. *Orion* reported one severe reaction from lot "D" January 28, 1925. A few minutes after the injection was completed the patient became dizzy and vomited; his pulse could not be felt and the apex beat could not be heard with a stethoscope. He was in profound shocklike state for nearly an hour. A similar reaction, following five minutes after the injection of 0.9 gram of neoarsphenamine of this lot, occurred at the United States naval hospital, Parris Island, S. C., March 13, 1925. Two alarming reactions, similar to the above in essential details, occurred at the United States naval hospital, Key West, Fla., with lot "D," January 5 and January 10, 1925, respectively. Lot "D" was recalled on this evidence.

A neoarsphenamine of a different make and lot number, which we will designate as "E," was reported by five ships and stations as causing altogether 10 severe reactions, one of which was fatal. The U. S. S. *Concord* reported two severe reactions in the person of the same patient, one in May and the other in June, 1925, each following an injection of lot "E." This man had had two courses of six injections of neoarsphenamine. On August 13, 1924, he had a mildly severe reaction following the intravenous injection of 0.6 gram of neoarsphenamine of a different make. Three more injections were

given after an interval of about one month without ill effect. These completed the first course, during which 29 inunctions of mercurial ointment were also given. The second course of arsenical treatment began after an interval of three months and consisted of six intravenous injections of neoarsphenamine of the same make as that used in the first course. Along with the arsenic the patient was given 14 inunctions of mercurial ointment. After a rest of three months, a third course of treatment was begun May 21, 1925, with 0.45 gram of neoarsphenamine, lot "E."

The patient appeared at the sick bay about 30 hours after that dose presenting red spots over the body varying in size from that of a dime to a dollar. He complained of headache, and his temperature was found to be 102° F. The spots faded in the course of a week. June 4, 1925, he was given 0.45 gram of "E" by intravenous injection. This was followed by a severe reaction, the details of which are discussed below. The standard instructions for medical officers of the Army, Navy, and United States Public Health Service state that "any evidence of an exfoliative dermatitis is an *absolute contraindication* against any further treatment with any arsenical." The red spots were evidently not taken to be indicative of danger in this respect. Cases of this sort are not regarded as necessarily casting suspicion on the quality and suitability of the drug for use.

The next report of a severe reaction following a dose of lot "E" came from the U. S. S. *Nevada*. The patient had primary syphilis, the disease having been recognized only a few days before with the discovery of *Treponema pallidum* in a smear from a lesion on the penis. The patient was reported to have received his first dose of neoarsphenamine, lot "E," 0.9 gram, on April 21, 1925. A few days later he was given one-tenth grain of mercury salicylate by intramuscular injection. April 28, 1925, he was given a second injection of neoarsphenamine, lot "E," 0.9 gram, about 1.30 p. m. The man reported at sick call the following morning, stating he had vomited and did not feel well. His temperature was 99.5, pulse 85, respiration 20. He was put to bed. His temperature rose during the day, and was 102.4° F., with pulse 100 and respiration 28, at 6 p. m., but no other symptoms had developed. April 30, at about 10 p. m., or about 56 hours after the intravenous injection, the patient began to moan and became mentally clouded or semiconscious. At that time his pupils barely reacted to light and his temperature was 104° F., with pulse 125 and respiration 25. At 2 a. m. the patient had a convulsion. At 6 a. m. he had another convulsion lasting about 5 minutes. He was transferred to the hospital ship, where he was admitted at 10.50 a. m., May 1, 1925, breathing stertorously

and practically in coma. He died 45 minutes later, or about 70 hours after the injection.

The fatal result was not attributed by the medical officer to any unusual toxicity on the part of the drug. We agree with him that this case did not necessarily indicate undue toxicity. On the same day 13 other men were each given 0.9-gram doses of lot "E" by intravenous injection, and none experienced any ill effects. From the clinical manifestations and result this case was an example of acute hemorrhagic encephalitis, similar in essential features to cases previously published by us as well as cases described by various observers in the United States and Europe. No post-mortem examination was made.

A court of inquiry was held in this case, and testimony was taken in detail regarding technique. There is no evidence of scientific import to indicate that there was any discoverable contraindication to giving the dose which resulted fatally or that any would have been found if a searching examination had been made, although it appears that the patient was not carefully examined immediately before the dose in question was given. The symptoms as recorded are quite typical of acute encephalitis. As similar cases which have been studied in this country and abroad indicate, it is not possible with present knowledge to foresee such a result. We can not at this time offer a satisfactory explanation why certain individuals, fortunately few, react in such manner to the second or third or even to the first dose of the drug. Cumulative effects of arsenic can be ruled out in some cases. Certainly when such a disaster occurs after the first dose of arsphenamine or neoarsphenamine, if there was no gross error in technique, and we have evidence that a great many doses of the particular lot have been given to many other men without causing any ill effect, the only conclusion that can be drawn is that special susceptibility or idiosyncrasy on the part of the patient is the sole or principal cause of fatal poisoning. It is altogether probable that this is true when death follows the second dose, although it is of course possible that the previous dose, while not actually bringing about a sufficient accumulation of arsenic in the system to cause death, may, when the second dose is added, act in some unknown manner to alter colloidal states or effect premature cleavage of the phenol compound, thus releasing the arsenic in sufficient concentration to cause acute fatal poisoning.

The United States naval station, Guantanamo Bay, Cuba, reported that two men had severe reactions, which were very much alike, following intravenous injections of neoarsphenamine, lot "E." Both had active syphilis in the early secondary stage with skin lesions. Each received 0.45 gram as the first dose and each had a severe

reaction beginning three or four hours after the injection, with nausea and chills, followed by fever of 103° F. in one case and 104° F. in the other. In both cases the skin eruptions were accentuated. The symptoms seem to suggest Herxheimer reactions. Each patient was given 0.9 gram of lot "E" one week later and both again had similar reactions. Twenty-seven other doses of lot "E" administered to other men at the station were not followed by severe reactions. These reactions are not regarded as indicative of excessive toxicity of the drug, but there is little doubt that lot "E" is fully potent from the standpoint of therapeutic action, and doubtless 0.9 gram represents a large dose compared with certain other lots distributed. In other words, in calculating dosage it would seem advisable to take into consideration the probable potency of the particular lot of the drug as well as the condition of the patient.

The U. S. S. *Wyoming* reported two severe reactions from lot "E," one in March, 1925, and the other in June, 1925. In the first case the patient, a young man, was given 0.6 gram by intravenous injection for Vincent's angina. This caused no reaction, although the patient stated he did not feel particularly well for several days. He did not have syphilis. Six days after the first dose he was given 0.7 gram, lot "E." Seventeen hours later he felt shaky and had coarse tremors of the hands, with general hypersensitiveness. There was twitching of muscles, particularly about the face. The pupils were dilated and there was general muscular weakness. The patient vomited. The pulse rate was somewhat increased. There was noticeable psychomotor retardation. Recovery followed after these symptoms had persisted for two days.

The description of this case suggests a mild acute encephalitis with involvement of peripheral nerves—acute arsenical poisoning. The medical officer did not attribute the symptoms to excessive toxicity of the drug. He reported that more than 80 intravenous injections of lot "E," some 0.45 gram and some 0.9 gram, had been given during the preceding three months without any severe reaction.

The *Wyoming's* second case was that of a man who had received one previous dose, 0.9 gram of lot "E," without severe reaction. The second injection, first series, was given June 16, 1925. This case also would seem to have been a case of acute arsenical poisoning following two maximum doses in a subject more susceptible than 21 other patients treated during the month, all of whom received 0.9-gram doses, 77 intravenous injections having been given.

The U. S. S. *Cincinnati* reported that a severe reaction followed the intravenous injection of a 0.6-gram dose of lot "E" in January, 1925. The report stated that the patient had been given two doses of neoarsphenamine (lot number unknown) in July, 1924, after which the drug was discontinued because of the development of

dermatitis exfoliativa. Thereafter salicylate of mercury in 1-grain doses was given by intramuscular injection once a week for 10 weeks. Almost immediately after completion of the injection of the dose given in January, following the interval of about six months, the patient became intensely nauseated. Slight cyanosis and persistent retching followed. The patient's appearance improved after the injection of 10 c. c. of adrenalin-chloride solution. Within two hours a sample of urine was found to contain one-half per cent albumin, with numerous casts. The patient appeared to have recovered entirely after five days.

A lot of neoarsphenamine, which we will designate as "F," was reported by the U. S. S. *Galveston* as causing three severe reactions, two mild and one more or less alarming in character. The latter consisted of a chill, followed by temperature of 104° F. and considerable prostration. The reaction passed off in eight hours. During the preceding 12 months the patient had had 105 mercurial inunctions. December 1, 1924, he was given his first dose of neoarsphenamine, 0.45 gram. December 7 he received 0.9 gram, lot "F," which was followed by the reaction described.

A lot of neoarsphenamine, which we will designate as "G," was reported by the U. S. S. *West Virginia* as causing three severe reactions in December, 1924, none alarming in character. The case reports did not suggest excessive toxicity of the drug.

A lot of neoarsphenamine, which we will designate as "H," was reported by the U. S. S. *Mississippi* as causing one severe reaction, which from the description appears to have been of an alarming nature. The patient had received 0.45 gram neoarsphenamine of a different make February 10, 1925, and 0.9 gram February 16, 1925, without ill effect. February 24, 1925, he was given 0.9 gram of lot "H" without severe reaction. March 3, 1925, he was again given 0.9 gram of lot "H," and this was followed in 15 minutes by manifestations of shock. The patient collapsed, became cyanotic, and his pulse could not be felt at the wrist. Respirations were shallow and rapid—45 per minute. Physical examination revealed wheezing rales suggestive of pulmonary oedema. There was blood-stained sputum. Auscultation indicated that the pulse rate was 145. The body was cold and covered with clammy sweat. The following day the urine contained casts and a moderate amount of albumin. There were episcleral hemorrhages in the right eye. All symptoms cleared up in the course of 18 days.

It appears that certain lots of neoarsphenamine caused a number of severe reactions which could not be attributed to errors in technique or to special susceptibility on the part of patients. These lots were withdrawn from the service. With reference to one lot number, there were 23 severe reactions reported by nine widely

separated ships and stations. There was a remarkable similarity in the symptoms reported. With this particular lot the outstanding symptoms were tingling, numbness, and swelling of the hands and feet beginning a few minutes after the drug was introduced into the vein. Most of the patients vomited. Four had shock-like symptoms and appeared to be in danger of collapse.

With reference to another lot, made by the same manufacturer, severe shock-like symptoms, beginning less than five minutes after completion of the injection, led to recall. With this lot, however, tingling, numbness, and swelling of the hands and feet were not noted. Altogether five alarming immediate reactions were reported by two widely separated naval hospitals, one naval station, and a cruising ship. Prior to withdrawal on the strength of these five cases a great many patients must have been treated in many naval organizations with this lot of neoarsphenamine without having severe reactions of any kind. A third lot produced by the same manufacturer was withdrawn from service because of severe immediate shock-like reactions.

A number of reports of severe reactions, 10 to date, following intravenous injections of neoarsphenamine of a certain lot number produced by a different manufacturer have been received. This lot has not been recalled. Except in one case, in which symptoms appeared almost immediately after the injection, the reactions began gradually after intervals of from 3 to 30 hours. The patient who had an immediate reaction had developed signs of dermatitis exfoliativa after a dose given six months before. The other reactions referred to here suggest that the patients received larger doses of a highly potent drug than they could tolerate without manifestations of poisoning. With one exception the reactions were not of an alarming character. In some of the cases the symptoms were like those of acute poisoning with inorganic arsenic. In four of the cases the reactions were in all probability Herxheimer reactions.

Size of dose in relation to risk of severe reaction.—There must be a certain relationship between the size of the dose of any potent neoarsphenamine and the probability that its intravenous injection will be followed by untoward effects, since it is possible to kill any patient if a large enough dose is given. Using the term "potency" to cover therapeutic value as well as power to cause toxic effects, we have reason to believe that the potency of various lots of neoarsphenamine varies considerably, and there may be a good deal of variation in the potency of different ampules of the same lot, especially after it has been kept for a considerable length of time under various conditions of storage. There is some evidence to suggest, too, that the potency, characteristic in general, of neoarsphenamine produced by one manufacturer may be different from that of another make.

With these considerations in mind, the statement regarding dosage contained in the standard instructions for the preparation and intravenous administration of arsphenamine and neoarsphenamine for use by medical officers of the Army, Navy, Veterans' Bureau, and United States Public Health Service is well founded. The statement is, "The initial dose, as a rule, should be small. The average dose is about 0.6 gram for 150 pounds body weight; but no attempts to lay down a hard and fast rule in this regard are made. The patient must be individualized."

Certainly 0.9 gram must be regarded as a maximum and not as an average dose, unless the particular lot number is known to be relatively nontoxic, and in practice that can seldom be known. The data thus far collected show that 0.9-gram doses have been given in the Navy in large numbers without any higher percentage of severe reactions than smaller doses. The figures are as follows:

Neoarsphenamine administered by intravenous injection

Size of dose	Number given	Severe reactions	Per cent
0.9 gram.....	12,604	¹ 27	0.21
0.6 gram.....	4,650	² 12	.26
Less than 0.6 gram.....	3,483	³ 8	.23
Dose unknown, but 0.6 gram or less.....		⁴ 11	
Total.....	20,737	58	.28

¹ 14 alarming. ² 5 alarming. ³ 2 alarming. ⁴ None alarming.

The ratios of alarming reactions per 100 doses administered were as follows:

Size of dose	Number given	Per cent
0.9 gram.....	12,604	0.11
0.6 gram.....	4,650	.11
Less than 0.6 gram.....	3,483	.06
Total.....	20,737	.10

First injections, possibly, were relatively more numerous with the smaller doses, but the data do not permit such differentiation to be made. We may say, however, that monthly reports of venereal diseases returned during the past seven months indicate that a number of medical officers have not followed the advice contained in the standard instructions, and have made it a practice to give 0.9 gram as the first dose to all patients. The data show that of the 27 severe reactions recorded as following 0.9-gram doses, 2 were in patients receiving the first dose. These were both immediate, alarming reactions of a shocklike character. The drug in both cases was lot "A,"

later called in on evidence of excessive toxicity. Of these 27 reactions, 10 occurred after the patient's second injection. One was fatal and three others were alarming in character. Four were associated with lot "A" and one with lot "D," both of which were later withdrawn from service. Lot "E" was involved in four reactions and lot "F" in one. Two of the 27 reactions followed a third dose. Both were more or less alarming in character. Lot "A" was involved with both of these, although they occurred in different months and in widely separated organizations. This lot was later withdrawn from service on the strength of this and additional evidence. One severe reaction followed the fourth of a series of doses, all of which probably were of lot "H." This reaction was of the immediate shocklike variety. It is the only reaction that has been reported from this lot of neoarsphenamine, which has not been designated for recall. One reaction followed a sixth consecutive dose. This was also of the immediate shocklike type. Lot "D," involved in this case, was withdrawn from service because of five similar reactions of an alarming degree reported by five different organizations.

There were 11 severe reactions following a 0.9 gram dose, the reports of which made no mention of any previous treatment. Some of these probably followed first doses, as the monthly report from one organization in which 8 of the 11 were notified indicated that no dose less than 0.9 gram had been given during the month in that organization. These eight reactions followed the injection of lot "A," later designated for withdrawal on evidence of excessive toxicity obtained from additional sources. Monthly reports for several months indicated that it had been the practice in the organization referred to not to administer any dose less than 0.9 gram. Three of the last-mentioned eight reactions were of the immediate shocklike type and appeared to be most alarming in character. One of the reactions in this group of 11 reported by a different organization was immediate in onset and most alarming in character with signs of collapse. Lot "D" was involved.

The reports of the other two reactions were indefinite and incomplete. It is known only that either lot "A" or lot "B" was involved. Both of these lots were subsequently recalled on other evidence.

There were 12 reactions following doses of from 0.6 to 0.9 gram. Only one of these followed a first dose. The lot, lot "A," was one of those since withdrawn from service. The dose was 0.6 gram. The reaction was not alarming and may have been of the Herxheimer type. The patient had not received any mercury.

Two of the 12 reactions followed a second dose. One of these was of the immediate shock-like type, and for about half an hour

it was questionable whether the patient would live. The dose was 0.6 gram. The neoarsphenamine used in this case was lot "B," later called in on apparently sufficient evidence of hypertoxicity. The dose in the other case was 0.7 gram of lot "E." This was the Vincent's angina case referred to on a preceding page.

One of the 12 reactions followed a third dose. The dose was 0.6 gram of lot "B," following two previous injections of 0.4 gram each. The symptoms appeared five minutes after the injection. There was faintness, blurring of vision, a sensation of numbness in the body, and tingling of the fingers and toes. The face was cyanotic; there was congestion and swelling of the pharynx and vomiting and diarrhea. The principal factor in this case was probably hypertoxicity of the drug. Lot "B" was later recalled.

Two of the reactions followed a fourth dose. In one case the dose was 0.6 gram of lot "G" and in the other 0.75 gram of lot "A." Both reactions were of the immediate variety. One began immediately after the injection was completed and was alarming in character, but serious symptoms lasted only for 15 minutes. The neoarsphenamine used in this case, lot "A," was considered to be hypertoxic on the basis of evidence obtained from other sources. The other reaction, following a dose of lot "G," appears to have been much of the same character but somewhat less severe. It was reported by a different organization.

One of the 12 reactions occurred after a fifth dose of 0.7 gram of lot "A" following four doses of 0.45 gram one week apart. The reaction began 10 minutes after the injection and was alarming and shock like in character.

Three severe reactions followed a sixth dose. In all three cases the dose was approximately 0.6 gram. Two of the reactions followed doses of lot "A." They were immediate reactions but not especially alarming in intensity. The other reaction followed an injection of lot "G" and was not alarming in character. The symptoms appeared about five hours after the injection and consisted of headache, vomiting, and abdominal cramps.

Two other severe reactions followed 0.6 gram doses. One occurred after a seventh injection. The symptoms consisted of headache, vomiting, and pain in the abdomen, appearing about five hours after the injection and lasting about two hours. Lot "G" was involved. In the other case the reaction began immediately after the injection. This was the case in which there was evidence of dermatitis exfoliativa six months before. The symptoms are described on a preceding page. The drug used was lot "E."

Doses less than 0.6 gram were followed by severe reactions in eight instances.

In three cases the dose was an initial dose of 0.45 gram. One of these was probably a Herxheimer reaction, and one of the others was possibly due more to the fact that the patient was heavily infected with syphilis than to excessive toxicity of the drug. In both of these cases the drug was lot "E" as designated above. In the third case the initial dose causing a reaction was 0.45 gram of lot "D." This was one of the immediate shock-like reactions of an alarming character which led to the recall of that lot.

A 0.45-gram dose of lot "A," the second dose given to a patient with malaria, was followed by a moderately severe reaction consisting of nausea, vomiting, chills, and fever with a temperature of 102° F. The symptoms subsided in the course of four hours.

One patient who received 0.45 gram of lot "D" as the second injection of his second course of treatment, following a previous dose of 0.45 gram, same lot number, administered one week before without causing a severe reaction, fainted two minutes after the second dose and signs characteristic of severe shock supervened.

Lot "A" was involved in another case where a severe reaction followed a 0.45-gram dose. This was the fourth of a series of doses comprising the second course of treatment. The preceding doses in order were 0.6, 0.9, and 0.9 gram at weekly intervals. These doses were all followed by swelling of the hands. This appeared to be one of the typical symptoms peculiar to lot "A," as noted by several different medical officers. In view of the previous manifestations the fourth dose was reduced to 0.45 gram. The symptoms reported as constituting the reaction after this small dose were vague. The patient complained chiefly of pain around the heart. He wanted to avoid further treatment. He had received 34 intramuscular injections of mercury, as well as 18 intravenous injections of neoarsphenamine, in a previous course of treatment.

There remain to be considered two reactions following 0.45-gram doses of lot "E." These reactions occurred in the person of the same patient, two weeks apart. The first followed the first dose of the third course of neoarsphenamine treatment. Symptoms appeared about 36 hours after the injection and consisted of a rise in temperature to 102° F. with headache and red spots on the skin. The eruption faded in five days. This case is referred to on a preceding page. The second dose was injected two weeks after the first. Four hours after the injection he appeared at the sick bay complaining of weakness and "burning" of the skin. Examination showed an erythematous rash similar to that which followed the previous dose. There were spots varying in size from that of a dime to the size of a silver dollar. These were red and slightly raised and they gave rise to a burning sensation. The patient's temperature at that time was 102° F. The pulse was

strong and the rate was not much accelerated. Three hours later he felt better and his temperature had decreased to 101.5° F. The following morning his temperature was 99° F., but the spots on the skin were still very red. He was discharged to duty four days after the injection, feeling well, but the spots were still rather angry looking.

The medical officer recorded his opinion that the reaction was in the nature of an acquired anaphylaxis or idiosyncrasy and was not due to deterioration of the drug, as none of the other patients had a severe reaction, and all were injected with neoarsphenamine of the same lot. He did not state how many other patients there were. It seems more probable that this particular man had had as much arsenic as he could tolerate in his system for some time.

By way of recapitulation it may be said with regard to size of dose that while the figures thus far collected do not in themselves indicate any greater hazards with the larger doses, the risk probably is definitely greater with a maximum dose, especially when administered to a patient who has not been tested previously with a smaller dose. The figures which indicate that 0.21 per cent of 0.9-gram doses, 0.26 per cent of moderate doses, and 0.23 per cent of small doses were followed by severe reactions, and the figures which indicate that the risk of encountering alarming reactions is no greater with 0.9-gram doses than 0.6-gram doses, should not be quoted without reference to modifying conditions. The first-mentioned ratios are based on all severe reactions reported. Some of the reactions were alarming and some were not. Some were in all probability Herxheimer reactions and some probably resulted from overtreatment.

There were in all 58 severe reactions following the intravenous injection of 20,737 doses of neoarsphenamine—all lot numbers—making a ratio of 2.8 per 1,000 injections. Of these 58 reactions 34 appeared to be really serious, making a ratio of 1.6 per 1,000 injections, and 21, or 1.0 per 1,000, were of a shocklike character, beginning in from 2 to 3 minutes to 20 minutes after the injection. In 2 of these cases the dose was 0.45 gram; in 7 it was about 0.6 gram, and in 12 it was 0.9 gram.

The outstanding symptoms were sudden onset of vertigo or faintness, with manifestations suggestive of a sudden fall in blood pressure; pallor, cold, and clammy perspiration; and rapid, soft pulse, in some cases intermittent or otherwise irregular. In seven cases the pulse could not be counted at the wrist. In one case the apex beat was counted at 145, and in another even the apex beat could not be heard. In one case only 38 beats could be felt in a minute. Cyanosis was observed in seven cases and pallor was described in nine. All but three of the patients vomited. Involuntary defecation occurred

in one case, and in another there was severe tenesmus, with repeated movements of the bowels. In one case there were signs of pulmonary œdema, with coarse râles and blood-stained sputum. The presence of albumin and casts in the urine was noted in two cases. In one case, two hours after the injection, the urine was found to contain one-half of 1 per cent of albumin. Swelling of the hands and feet or œdema of the face or lips was mentioned in 11 cases. In one case the tissues of the mouth and throat became markedly œdematous. Episcleral hemorrhages occurred in one case. Several patients complained of tingling or burning sensations in the hands and feet.

The symptoms in this group of cases were very similar to those in the case of the man who died at Dahlgren, Va., October 21, 1924, about one hour after the intravenous injection of 0.9 gram of neoarsphenamine. The reaction began a few minutes after the injection. The case was described in detail in the February, 1925, number of the BULLETIN. Some of the patients in this group appeared to be *in extremis*, but all recovered from the more alarming symptoms in from half an hour to 24 hours. In the case of the patient with signs of pulmonary œdema recovery was not complete for 18 days, and in one other case, with kidney involvement, the time for recovery was reported as 5 days.

Five different lots of neoarsphenamine were involved with these 21 immediate reactions. Lot "A" was the drug in 12 cases, lot "D" in 5, lot "B" in 2 cases, "E" in 1, and "H" in 1. Lots "A," "B," and "D" were produced by one manufacturer and lots "E" and "H" by one other producer.

Besides the 21 immediate reactions just discussed there were 13 others which must be classed as serious. The fatal case accounts for one of these. In 4 of the 13 the drug itself was probably responsible for the reaction rather than the condition of the patient, previous treatment, technique, or size of dose, although the dose in all 4 cases was 0.9 gram. The drug was lot "A" which was involved, as we have just said, in 12 of the immediate shock-like reactions. While none of these four patients appeared to be at the point of death at any time, all presented symptoms that are suggestive in the light of symptoms exhibited by patients treated with the same lot at or about the same time in widely separated naval organizations. When the case reports of certain severe reactions are studied in connection with the evidence relating to other severe reactions following doses of a given lot number, it becomes apparent that certain reactions, while they did not appear especially alarming in themselves, in reality differed only in degree from reactions of the most extreme type following other doses of the same lot number administered elsewhere.

Of the 13 severe reactions which we are now considering, 4 appeared to be of the Herxheimer type—that is, the symptoms probably arose from a reaction between the drug and the causative agent of syphilis. The drug in these four cases was lot “E,” which on the basis of all the evidence available appears to be of high therapeutic potency. If this drug is given in maximum doses, a certain number of severe reactions must be expected. In these four cases the symptoms were chill, beginning in from three to four hours after the injection, followed by fever of 103°, 104°, and 105° F., with accentuation of a secondary syphilitic eruption, nausea, and vomiting. In three cases recovery was complete in 36 hours and in one case 72 hours.

The reactions in two other cases were possibly Herxheimer reactions. One of these patients had a chill beginning five hours after the injection, followed by a temperature of 104° F. No mention was made of a syphiloderm. The reaction was reported as lasting 12 hours. The drug was lot “A.” The dose was 0.6 gram, first injection. The other patient had similar symptoms, but the time of onset was not given. The drug was lot “F,” second injection; dose, 0.9 gram.

There remain to be considered three cases. The drug used in all three was lot “E.”

In one case, four hours after the injection, the patient was seized with pains in the stomach, accompanied by vomiting and severe retching. Continued fever followed, reaching its height on the fourth day, when the temperature was 102.8° F. On the fourth day an erythematous rash appeared on the trunk and extremities with hyperæmia of the pharynx. After two days the eruption became macular, and it began to fade on the eighth day. On the fourteenth day a fine scale was noted. The patient was kept on the sick list for about four weeks, the last two weeks largely on account of weakness in the legs, particularly weakness of the thigh muscles. The clinical manifestations in this case suggest that the patient was especially susceptible to the drug and that the symptoms were those of acute arsenic poisoning. The dose was 0.9 gram following one previous injection of 0.9 gram. No mention was made of mercurial treatment, but presumably the patient had not received any mercury.

The second of these three cases appears to have been a mild case of acute encephalitis incidental to acute arsenic poisoning, with recovery after two days. This was the case of Vincent's angina described in the forepart of this article. The patient had received an intravenous injection of 0.6 gram six days before. The second dose was 0.7 gram. Both doses were of lot “E.” Symptoms appeared 17 hours after the second injection.

The third case, also, was probably an example of acute poisoning by arsenic. Acute encephalitis appears to have been the predominating feature. The symptoms developed 17 hours after the injection, and the patient died about 70 hours after the injection. The dose was 0.9 gram. This was reported as the second dose following an injection of 0.9 gram given seven days before.

Tentative conclusions, it appears to us, which may logically be reached from this study are, first, that while 0.9-gram doses of a potent neoarsphenamine may be given in thousands of cases, including first doses, without encountering any very severe reaction, there is a distinct risk in making the first dose 0.9 gram, which should be avoided; and, second, that maximum doses can not be given at intervals shorter than one week for many doses without causing acute poisoning by arsenic in some cases. A third conclusion is that, while most of the immediate shock-like reactions which occurred in this series were caused by lots of neoarsphenamine which appeared to be hypertoxic and unfit for use, freedom from such phenomena can not be guaranteed with a lot which, according to all criteria that can be applied, is safe for general use.

The data thus far collected are not sufficiently voluminous to justify a close estimate of the future probability of encountering such a reaction in terms of 1,000 or more intravenous injections. A good deal will depend upon the care with which medical officers report severe reactions observed by them and the promptness with which evidence suggesting dangerous qualities of certain lots is acted upon.

The effect of bad technique is hard to determine. It is too much to expect that reports will throw much light on this question. We believe, however, that the prescribed standard instructions are being carefully followed in general. There is always the possibility that, although a large number of doses may have been given in the particular organization without serious errors in technique, something known or unknown did in fact go wrong in preparing or injecting the dose in question. Except in two cases of the series reviewed in this paper, no medical officer considered that anything connected with technique was responsible for severe reactions. In those cases, on the same day, each of two men was given 0.9 gram of neoarsphenamine dissolved in sterile water which had been distilled three days before. No other doses were given that day. Both men had severe reactions, although each had previously received the same amount of the same preparation mixed with freshly distilled water without reaction, and both were subsequently treated without severe reaction. The medical officer considered that the water was at fault, but this seems doubtful, because the drug was of a lot which was connected with many severe reactions in various widely separated organizations. It is, of course, preferable to use freshly distilled

water, but the important considerations are that the water shall have been distilled in glass and kept in glass free of alkali and in a container having a glass stopper. The water must be sterile and must not contain any alkali, metallic, or mineral matter. A rubber stopper may be dangerous.

Last year, before the systematic collection of data relating to all severe reactions observed in the Navy was begun, the naval hospital at Charleston, S. C., reported that a number of severe reactions had followed doses of neoarsphenamine of the lots which we have designated in this paper as lot "A" and lot "B." Samples of both lots were forwarded to the bureau and were examined in the United States Hygienic Laboratory. The samples were in good condition, and tests for toxicity gave results well above the requirements indicative of safety for clinical use. The reader will note that both of these lots later gave rise to so many severe reactions, some of them most alarming in character, under different conditions in widely separated naval organizations, that both lots were withdrawn from service. They are mentioned here because the question of purity of the distilled water used in preparing solutions at the Charleston hospital was raised at the time. In the light of more complete knowledge of those lots it now seems probable that the contents of a certain number of ampules had undergone chemical change and that some of the ampules used at the hospital were dangerous. The contents of certain ampules of one of the lots were indeed found at the hospital to go into solution slowly, and a red precipitate was found in solutions prepared with some samples of the other lot. The samples of both lots forwarded to the United States Hygienic Laboratory proved to be in good condition.

An inquiry was made as to the quality of the water which had been used at the naval hospital in Charleston, and it was found that during the period in which the severe reactions occurred the distilled water was purchased in Charleston, the hospital distilling apparatus being out of commission. This might have been considered a suspicious circumstance at the time. However, upon chemical examination no trace of any of the common metals, chlorides, carbonates, or sulphates could be detected. A thorough examination of nitrites could not be made. The experience at Charleston is of interest in connection with the later history of lots "A" and "B."

Regarding technique, it may be said that studies made in the past show that it is very important to avoid certain errors. Careful inspection of the prepared solution should invariably be made to detect any fine precipitate which may result from incomplete solubility

of the drug. No solution containing any such precipitate should be injected. The volume of distilled water must be as great as called for in the standard instructions. There is no reason to believe that one is justified in injecting the solution at a rate more rapid than is recommended in those instructions. How often the instructions can be ignored without encountering severe reactions is, of course a question that can not be answered.

Medical officers in describing severe reactions should in justice to themselves make it clear that none of these avoidable errors could have been responsible for the symptoms. The medical officer's opinion as to what caused the reaction may be of considerable value and it may well be stated in the report, but it should be remembered that a study of the case in comparison with other cases occurring in different organizations following the administration of the same lot of drug may suggest a different conclusion. An expression of opinion will not be of any great value unless the report also contains all essential facts relating to the drug and a concise but complete account of the manifestations regarded as constituting a severe reaction. It is desirable also that preparation of the solution and the method and rapidity of injecting it be covered in the report.

Much remains to be learned about the keeping qualities of neoarsphenamine, but some packages of certain lots of neoarsphenamine withdrawn from service have shown signs of deterioration when others did not. It was found, too, that certain cartons contained one or more ampules which had deteriorated, while the other ampules in the same container appeared to be in as good condition as when released. An effort is now being made with the aid of the United States Hygienic Laboratory to determine the effects of storage conditions to which samples of various lots of neoarsphenamine of different makes have actually been subjected on board ship and at naval stations in various climates. At present it may be said that different lots of neoarsphenamine which had been in use in many different naval organizations when subjected to tests after being recalled were found to be irregular in solubility. Although we do not know how long the drug will keep when stored in a warm place, we know that chemical changes take place slowly in the cold, and it is therefore desirable that neoarsphenamine be kept in cold storage along with cowpox virus and other biological preparations. Thus far it appears that neoarsphenamine returned from naval stations in warm climates has shown a higher rate of deterioration than quantities returned from organizations wherein the conditions to which the drug was subjected are not known.

One lot of neoarsphenamine was discovered at the United States naval medical supply depot, Canacao, P. I., not to comply with specifications after one shipment had been made to the United States naval

station, Cavite, P. I. When preparing to administer the drug, the medical officer of the yard found that the contents of five ampules were off color and incompletely soluble. The whole shipment was returned to the supply depot, thus probably preventing some bad reactions. Samples were forwarded to the Bureau of Medicine and Surgery. These were examined in the United States Hygienic Laboratory and found no longer fit for clinical use. Control tests on reserve samples showed no evidence of deterioration, and the director of the laboratory therefore presumed that the change was due to exposure to relatively high temperature over a long period of time.

SEVERE REACTIONS FOLLOWING THE ADMINISTRATION OF ARSPHENAMINE OF
VARIOUS LOT NUMBERS

During the six months from December, 1924, to May, 1925, inclusive, during which reports of the administration of arsphenamine and other arsenic containing compounds in the treatment of syphilis in the Navy have been required, and including the data taken from such June reports as have been received, it appears that 2,929 doses of arsphenamine of different lot numbers of one make were given by intravenous injections. Six severe reactions were reported as resulting from these doses, making a ratio of 2.04 per 1,000 doses. These all occurred at three naval hospitals, and but two lot numbers were involved.

Three of the reactions were reported by one hospital. These occurred in the month of February. The reports were too incomplete to furnish as much information as it is desirable to have.

The patient in the first case appears to have had psoriasis and not syphilis. He had received five previous doses of 0.35 gram at weekly intervals. The reaction was described as follows: "Had early reaction; was being treated for psoriasis; no syphilitic condition existed; had chill; temperature, 102° F.; asthmatic breathing and some cyanosis; responded to treatment with adrenalin."

The second patient received a dose of 0.45 gram. This was his second dose following a previous dose of 0.35 gram. The time of onset of symptoms was not stated. The patient had a chill, followed by a temperature of 104° F.; he vomited; later, jaundice developed. There was believed to be impairment of liver function in that case. There were no reactions among 15 other men injected with the same arsphenamine on the same day.

No details were given for the third case except that the patient had active syphilis in the secondary stage; it was the first dose; the amount was 0.45 gram; the patient had a chill and temperature of 102° F. This may have been a Herxheimer reaction as may also have been the case mentioned above.

The arsphenamine used in these three cases was of the same lot which we will designate as "S."

The fourth case, in the order in which described here, seems to have been a local reaction in the arm for the most part, although the medical officer expressed the opinion that the symptoms were those of acute poisoning developing about seven hours after the injection. The symptoms were consistent with those which might be expected from leakage of the solution into the subcutaneous tissues. The report was as follows: "Following fifth injection of arsphenamine patient developed symptoms of acute poisoning about seven hours after treatment; temperature, 100°; pulse, 80; chill, headache; heat, swelling and pain in the right arm in which the solution was administered * * *; recovered second day of treatment; gravity method used in administering arsphenamine." The dose was 0.6 gram. Forty-four other doses were given at the hospital during the same month without severe reactions. The arsphenamine which was used in this instance was of a lot which we will designate as "T."

The arsphenamine used in the fifth and sixth cases was also "T."

The fifth case was reported by the same hospital that reported the fourth case but in a different month. The patient had had seven previous injections without any severe reaction. This, the eighth dose, was 0.4 gram. Nine other patients were given injections of lot "T" on the same day without reactions. After the dose had been given to the patient in question, while still on the table, he began to breathe rapidly and become cyanotic. His eyelids, nose, lips, and cheeks rapidly became edematous. In a few minutes nausea developed and he vomited. One c. c. of adrenalin chloride solution, 1 to 1,000, was given intravenously. Cyanosis lasted about five minutes. Nausea and vomiting persisted for several hours. The patient felt well next morning. He admitted that he had eaten a hearty meal of bologna and wheat cakes before reporting at the hospital for arsphenamine treatment.

The sixth case occurred at a different naval hospital. This was reported as a moderately severe reaction which subsided completely in eight hours. However, six days later the patient became jaundiced. On the tenth day jaundice was intense and continued so to the thirty-fifth day. The patient had active syphilis in the secondary stage. He had had two previous intravenous injections of the same lot at weekly intervals. The third dose, which was followed by severe reaction, was 0.4 gram. This with the other two doses made a total of 1 gram. The patient had also received one dose of mercury salicylate, 1 grain, 18 days before. Following the intravenous injection of the third dose of arsphenamine the pulse rate rose to 110; the patient complained of headache and of feeling

"light-headed." He vomited. After eight hours he felt well until jaundice developed on the sixth day.

Thirty-six other injections of lot "T," in amounts from 0.2 to 0.6 gram, were given on the same day without causing severe reactions, and 168 doses of the same lot were administered during the month without ill effects.

SULPHARSPHENAMINE

From December 1, 1924, to July 1, 1925, 548 doses of sulpharsphenamine were given without any severe reaction. Most of the reports have not specified the method of administration, so it can not be stated how many doses were given by intramuscular injection and how many by intravenous injection. The instructions for preparing monthly reports did not exactly require that the method of administration be stated except in cases in which severe reactions occurred. This illustrates the difficulty of collecting precise and definite information in an investigation of this kind. If every little detail is not thought of in advance, reports are likely to lack important information.

TRYPARSAMIDE

Five hundred and thirty-one doses have been given without severe reaction. The doses were from 2 to 3.9 grams.

HAMBURGER STEAK AS A POTENTIAL VEHICLE FOR BACILLI OF THE MEAT-POISONING GROUP

The following report of a small outbreak of food poisoning was furnished by the commanding officer of the U. S. S. *Wyoming*:

"There occurred on board this vessel a limited number of cases of food poisoning on April 24 and 25, respectively, nine days out of San Francisco while en route to Honolulu.

"Twelve cases were admitted to the sick bay in the late afternoon and evening of April 24. Sixteen cases were admitted during the next day, April 25, and two cases were admitted early on the third day, April 26. The symptoms were those of acute gastrointestinal disturbance with fever. There was an average range of temperature from 100° F. to 102° F., pulse 100 to 110, general abdominal cramps, frequent stools (four to six per day, with no blood), and vomiting, particularly in the early cases. Quite a number of the later cases did not vomit. One case had a marked numbness and tingling of fingers and another case a rather pronounced numbness of entire left arm. There were 24 cases from the engineer's division and 6 cases from the deck divisions. It was not limited to any par-

ticular mess. The delayed cases were principally firemen, and their strenuous duties below during a war game very likely contributed to their illness. All cases recovered. The average confinement to bed was about two days.

"The menu for the day previous to the outbreak and for the day of the appearance of the first cases is appended. Hamburger loaf was served for supper the day before the trouble started. All of the cases except one admitted having eaten some of this loaf. Creamed salmon was served at noon, about three hours before the first cases reported. Seventy-five per cent of all cases denied having eaten the salmon and stated that they had felt indisposed since the night of April 23. In fact, quite a number had had no food since the supper the night of April 23, when hamburger loaf was served. A quarter of beef was drawn from the cold storage at 6 a. m. At 2 p. m. it was taken from the chilling room, and the hamburger loaf was prepared from it and was served for supper at 5 p. m. The beef was normal in appearance and was not suspicious in the least. This was most probably a *Bacillus enteritidis* (Gartner) infection conveyed through the hamburger loaf.

MENU

THURSDAY, APRIL 23, 1925

Oatmeal and milk.	Vegetable soup.	Hamburger loaf.
Fried pork sausage.	Roast ribs of beef.	Fried onions.
Pan gravy.	Pan gravy.	Boiled potatoes.
Mashed potatoes.	Mashed potatoes.	Boiled beans.
Bread, butter.	Spinach and bacon.	Bread.
Coffee.	Chocolate pie.	Tea.
	Bread.	
	Coffee.	

FRIDAY, APRIL 24, 1925

Hominy grits and milk.	Cream potato soup.	Fresh beef stew.
Individual omelets.	Creamed salmon.	Egg dumplings.
Fried bacon.	Browned potatoes.	Rice pudding.
Baked potatoes.	Buttered beets.	Hot biscuits.
Bread, butter.	Raisin pie.	Bread, jam.
Coffee.	Bread.	Tea.
	Coffee.	

Comment.—It is not improbable that contamination of the meat used in making the hamburger loaf by a human carrier of one of the bacilli belonging to the meat-poisoning group was responsible for poisoning, but, of course, that is only a surmise. If so it would appear from the varying incubation periods and continuation of fever and diarrhea that living bacilli were ingested by some or most of the men who were affected.

The bureau continues to receive reports of cases of food poisoning in surprisingly large numbers, and too often exact information regarding the suspected food, which would be of value in considering the causes which led to contamination of the food and poisoning, is lacking, although some definite and pertinent information could easily have been obtained by questioning those concerned with the handling and preparation of the food.

The relation between hash for breakfast, when prepared the night before, and food poisoning must now be generally understood, but ground-up meat served in other ways and at meals other than breakfast should not be overlooked as good culture media and a potential cause of an outbreak of poisoning if contaminated by a carrier or by rodents or insects.

It appears that some medical officers have not read the articles on food poisoning which have appeared in previous numbers of the BULLETIN or have not otherwise informed themselves in the matter of prevention. For example, a small outbreak of food poisoning recently occurred on board a certain ship, and in response to a bureau letter calling for a questionnaire report an incomplete, indefinite, and generally unsatisfactory reply was received. A number of men began to develop symptoms consistent with those of food poisoning early in the evening of a certain day about an hour after sunset. About 50 men were affected, but it appears that only 6 were admitted to the sick list. "The remainder were given no treatment other than a laxative. Three of the six patients had moderate collapse and vomited blood-tinged fluid. The other three were kept on the sick list for one day." The symptoms were slight fever, weakness, and diarrhea.

Vegetable salad was mentioned as the suspected food. This had been served at supper the day before, or approximately 27 hours before signs of illness appeared. The salad consisted of green onions, lettuce, cucumbers, and potatoes. It was prepared during the day.

It was stated that the rest of the crew ate the same food without becoming ill. There was no information to indicate whether or not the men who were affected could have eaten food not eaten by some or all of those who were not affected.

Assuming that contaminated food was the cause of the outbreak and that the food was eaten on board ship, inspection of the menu offers a suggestion which apparently was not considered. Fried hamburger steak was served at supper the day of the outbreak, just about the length of time before the development of symptoms in the most severe cases that might be expected to elapse had the meat been contaminated and then kept in a warm place for a

few hours to permit the microorganisms to incubate. No conclusion regarding the cause of the outbreak could be derived from studying the report.

**THREE CASES OF FOOD POISONING ATTRIBUTED TO EATING FRESHLY
CAUGHT FISH—YELLOW JACKS**

The following report of three cases of food poisoning, presumably caused by eating yellow jacks which had been caught by members of the crew of the U. S. S. *Robin* in waters adjacent to St. Thomas, Virgin Islands, a few hours before the fish were eaten, was submitted by Pharmacist's Mate (First Class) Clifford R. Gregory, Hospital Corps, United States Navy:

The first patient, C (mess attendant, first class), was performing his regular duties as mess attendant at time of poisoning.

The suspected food was fish of a bright yellow color, one of several eaten by different men. They were fresh at the time of eating. Upon extensive questioning these fish were determined to be yellow jacks. They were eaten at the noon meal Saturday, February 7, 1925, aboard ship.

C's ration is commuted, and he eats the food that is served in the officer's mess. As there is no menu kept in that mess, it is impossible to determine the food served 48 hours previous to the poisoning. C may also have eaten general mess food to a certain extent.

All food served in the general mess was of excellent quality and was prepared under sanitary conditions.

C ate the suspected fish about 1 p. m., February 7, 1925, and reported at the sick bay about 5.30 p. m., or about four and one-half hours later.

One other man was made ill at the same time, G (mess attendant, first class). He ate some of the same fish, and about four hours later he complained of headache and general muscular pain. He was given a vegetable cathartic and felt much better after thorough evacuation of the bowels, but the muscular pain continued for several days. The pain was not severe.

The same food was served to the officers for luncheon on Saturday, February 7, and no officer was affected. An officers' cook and steward also ate of the same fish and were not affected.

The first indication of illness was dizziness, headache, pain and cramps in the legs. Later there was abdominal pain and marked diarrhea.

The onset was sudden.

There had been no previous disease or symptoms.

This attack could not have been a relapse or recurrence of any disorder.

The patient was seen by the pharmacist's mate immediately upon exhibition of the first symptoms.

The patient was sullen and was continually talking of the pain in his knees and legs.

There was pain, general, but more marked in the knees and legs and abdominal regions. The pain was continuous, but after thorough purging the abdominal pain was subdued. The pain in the knees, legs, and head continued for 48 hours and was severe.

There was vomiting for a period of about five hours after starting.

There was intestinal pain and slight abdominal distention.

There was diarrhea, very marked, of a watery consistency and an unusually foul odor.

There was no chill.

Temperature was subnormal—97° F.

There was headache, frontal, occipital, and temporal, but mostly temporal.

There was general aching and soreness.

There was no sudden or marked prostration.

The mouth was comparatively dry, with a mild bitter taste.

There was ptosis, blurring, and disturbance of accommodation. Pupils were dilated but reacted to light.

The skin was cold and clammy, with no alternate flushing and pallor.

The pulse rate was about 60 and remained so for several days. The pulse was regular. Blood pressure was not taken.

Respirations were about 14 per minute, deep and sighing.

There was no skin eruption.

No blood count was made.

The urine was not examined.

No toxicological or bacteriological examination was made of either vomitus or stools.

The fish in question were freshly caught by members of the crew and were caught only a few hours prior to cooking. They were prepared, handled, cooked, and served in a sanitary manner. They were boiled with onions and tomatoes.

No examination was made of the food and none was fed to animals for experimental purposes.

The food was prepared and eaten aboard ship.

The following is submitted in the case of K (water tender, second class):

K had been performing his regular duties as water tender prior to eating the suspected fish, but was not on watch at the time.

The food suspected was fish of the same type as those eaten by C, but they were caught several days later. The fish were eaten at about 1 a. m. February 12. K helped to catch the fish and asked the baker on watch to call him when they were ready to eat. The last fish caught was caught about 11 p. m. February 11. They were as fresh as it was possible for them to be.

The following menus for the 72 hours preceding the attack are submitted:

MONDAY, FEBRUARY 9, 1925

Breakfast	Dinner	Supper
Scrambled eggs. Fried bacon. Bread, apple sauce. Coffee.	Rice and tomato soup. Pot roast of beef. Brown gravy. Baked brown potatoes. Baked sweet corn. Cocoanut pudding. Bread. Coffee.	Fried pork chops. Buttered lima beans. Mashed potatoes. Cookies. Bread, jam. Iced tea.

TUESDAY, FEBRUARY 10, 1925

Breakfast	Dinner	Supper
Fried pork sausage. Fried potatoes. Pan gravy. Canned prunes. Bread, apple sauce. Coffee.	Cream tomato soup. Breaded veal cutlets. Gravy. Creamed mashed potatoes. Canned string beans. Bread. Coffee.	Fresh-beef stew. Egg dumplings. Baked macaroni with cheese and tomatoes. Chocolate pie. Bread, jam. Iced tea.

WEDNESDAY, FEBRUARY 11, 1925

Baked pork and beans. Tomato catsup. Cinnamon buns. Bread, butter. Coffee.	Tomato soup. Roast beef, onion gravy. Boiled potatoes. Bread. Coffee.	Cold beans. Potato salad. Cheese. Corned beef. Chocolate cake. Bread, jam. Iced tea.
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All food was of excellent quality and was well prepared under sanitary conditions. No member of the crew was affected by any of this food, but several who ate of the fish had mild symptoms.

K ate the suspected fish at about 1 a. m. February 12, 1925, and according to him he was awakened about 6 a. m. the same morning with headache, general malaise, and abdominal pain, which increased in severity. He reported at the sick bay at about 8 a. m., or about seven hours later.

Two others who partook of the fish were made ill at the same time. One suffered a mild diarrhea with headache and slight abdominal pains. Later on there were mild muscular pains and cramps. After a thorough vegetable purge he was greatly relieved. The other suffered headache and general mild muscular pains and cramps. After a purge he was relieved, but the cramps in his knees and legs continued for a week afterwards.

Two men who ate of the fish said they would like to have had more the next morning. They evidently felt fine and suffered no ill effects.

Headache, general malaise, and intense abdominal pain were the first indications of K's illness.

The onset was sudden. He was awakened by the pain.

There had been no previous disease or symptoms, although K is not of a very strong type.

This attack could not have been a relapse or recurrence of any disorder.

The patient was seen by the pharmacist's mate about two hours after the first symptoms were noticed.

The patient was worried and nervous.

There was pain—abdominal, cranial, and general muscular pains. Pain was severe and spasmodic.

There was vomiting at about 8.30 a. m. This continued for a short period.

There was abdominal pain and colic.

There was marked diarrhea about 8.30 a. m., but it lasted only about an hour, during which time there was much vomiting and retching and the patient appeared to be miserable.

There was a slight chill from about 8.30 till 9.30 a. m.

Temperature was subnormal—97° F.

There was severe headache at the onset, but it died away in a few hours. It was a general headache.

There was general pain and soreness, which increased for several days and then gradually subsided.

There was marked prostration about 8.30 a. m.

The mouth was dry and patient complained of funny taste in mouth.

There was ptosis and disturbance of accommodation. The pupils were dilated but reacted to light.

The patient was cold and clammy at the onset and remained so for 24 hours, when he gradually seemed to grow better.

The pulse rate was extremely low at one time, 25 per minute, and was intermittent. Later it became rapid and difficult to count, but soon steadied to about 60 per minute and became regular. Blood pressure was not taken.

Respirations at the time the patient was first seen were as low as 8 per minute, but the rate advanced to about 22 in a short period, and then steadied to about 12. It was of a gasping nature.

There was no skin eruption.

No blood count was made.

The urine was not examined. At one time the patient passed urine involuntarily.

No toxicological or bacteriological examination was made of the vomitus or stools.

The fish were caught between 9.30 and 11 p. m. February 11 and were handled, prepared, and cooked in a sanitary manner. They were cooked about three hours at the most after being caught. The fish were baked with bacon and tomatoes.

None of the suspected food was examined and none was fed to experimental animals.

The food was prepared and eaten aboard ship.

Comment.—It is a fair conclusion that the symptoms in these cases resulted from eating fish, the meat of which was intrinsically poisonous. The fish, sometimes called "yellow jack," is also known as "horse-eye jack." It is the *Caranx latus* or *Carang latus* or *Caranx fallax*. It is also known as "cavalla" in the Virgin Islands. It occurs in all tropical seas and is very abundant in the West Indies and in Brazilian waters. Gatewood stated that this widely distributed species is reported as at times poisonous, but that it is often found in the markets of Porto Rico, where evidently its reputation as poisonous does not hold. He also made the point that it is safest in the Atlantic to discard any caranx which has not a well-marked black spot on the gill-covers. In the Atlantic, a caranx weighing more than 2 pounds should attract attention, as the *Caranx latus* may often greatly exceed that weight, while the other species seldom do.

"Carang" or "caranx" poisoning in the Virgin Islands was discussed in an article by Lieut. F. D. Walker, Medical Corps, United States Navy, entitled "Fish poisoning in the Virgin Islands," pub-

lished in the August, 1922, number of the BULLETIN. Doctor Walker stated that the greater portion of carang caught are seine fish, caught near the surface of the sea, and these are considered good food in contrast to the "yellow jack" variety of carang, which is generally considered poisonous.

**NEW YORK STATE DEPARTMENT OF HEALTH SPONSORS LECTURE SERIES
ON SEX EDUCATION AND SOCIAL HYGIENE**

In a recent release of Health News, the United States Public Health Service publishes the information that the New York States Department of Health has arranged a series of special lectures to be given throughout the State as a part of its educational work in venereal-disease control. These lectures, five in number, are to be delivered by men and women of wide experience and special knowledge in sex education and venereal diseases.

The keen interest of various New York communities in sex education and venereal-disease prevention is shown by the fact that since 1919 there were given, exclusive of New York City, almost 4,000 lectures, with an attendance of about 500,000 persons, and that there were distributed more than 3,000,000 pamphlets.

A recent announcement states that the urgent need of the lectures may be gleaned from these facts: Many cases of syphilis and gonorrhea are contracted innocently; many adolescent youths are infected before they have acquired an effective sense of social responsibility; hundreds of babies are born annually with either active or latent syphilis; venereal diseases may be arrested by modern medical treatment, so that the diseased person will be rendered non-infectious; and many cases could have been prevented through education, character training, and the inculcation of health habits during and previous to adolescence.

**VENEREAL DISEASE LECTURE CONDUCTED FOR MALE EMPLOYEES OF
THE ATLANTA, BIRMINGHAM & ATLANTIC RAILWAY CO.**

Health News, issued by the United States Public Health Service, states that a special meeting of all male employees on the Brunswick division of the Atlanta, Birmingham & Atlantic Railway Co. was recently held in Fitzgerald, Ga., for the purpose of hearing a lecture on the venereal diseases. The company provided free transportation for all employees; 600 passes were issued. The auditorium, with a seating capacity of 1,200, was filled; 300 persons were turned away.

This meeting was arranged by the Georgia State Board of Health. In announcing the lecture the Fitzgerald Herald said: "We quarantine smallpox, yet it kills relatively few and ruins no future generations. Social diseases are winked at, yet 25 per cent of the male population fall victims, and generations far down the weave of years will fill jails, asylums, and institutions for the unfit because of them."

This and similar meetings as part of the venereal-disease control activities of the Georgia State Board of Health seek to enlighten the general public on the dangers of the venereal diseases, how their spread may be controlled, what they cost both in health and money, and how preventive measures may be effectively employed.

FAILURE, TEMPORARILY, TO STERILIZE MESS GEAR A POSSIBLE FACTOR LEADING TO INCREASE IN THE PREVALENCE OF ACUTE RESPIRATORY DISEASES AT THE UNITED STATES NAVAL TRAINING STATION, NEWPORT, R. I., IN MARCH, 1925

The senior medical officer of the United States naval training station, Newport, R. I., in the sanitary report of the station for March, 1925, expressed the opinion that an increase in the prevalence of acute respiratory diseases which occurred during the month was due to failure to sterilize mess gear. He wrote as follows:

"The incidence of the mild respiratory diseases and acute tonsillitis was increased somewhat owing to a temporary failure of the apparatus for sterilizing mess gear in the sculleries of barracks "A" and barracks "B." The increased ratio of occurrence of these diseases was concurrent with the temporary period during which the mess gear was not being sterilized. The various causes contributing to failure of mess-gear sterilization were investigated by the medical officer and reported to the commanding officer, who directed that the sterilization of mess gear be immediately resumed and maintained. Regarding this subject the medical officer is strongly convinced of two things: (a) The high degree of efficacy that sterilization of mess gear renders in the prevention of various kinds of communicable diseases, particularly under the conditions of grouping men aboard ships and in barracks that necessarily exist in the service; and (b) that the proper sterilization of mess gear will not be accomplished without the energetic supervision of the medical officer."

**COMMANDER OF SCOUTING FLEET COMMENTS ON INSANITARY METHODS
OF WASHING OFFICERS' MESS GEAR**

In forwarding certain reports submitted by vessels of the fleet on apparatus for the washing and sterilization of crew's mess gear, the commander of the Scouting Fleet commented on conditions in officers' messes as follows:

"In this connection there is believed to be much room for improvement, from the standpoint of sanitation, in the washing of officers' mess gear. It is understood that the greatest obstacle to adapting a washing machine to officer messes is the large variety and breakableness of dishes and gear used, which may make a machine prohibitive. Numerous instances have been noted, however, in washing of glasses particularly, which violate the most elementary principles of sanitation. In the present large messes of 30 to 40 individuals this warrants some consideration."

**NOMENCLATURE TITLES TO BE USED IN CASES WHERE TEETH ARE
EXTRACTED BECAUSE OF FOCAL INFECTION**

Many cases of extraction of teeth are reported under diagnosis number 2100—Absence, acquired, teeth—where it is noted that the teeth were extracted to remove focal infection.

In order that these cases may be properly charged with due value to the underlying condition, where focal infection of the teeth exists, the case should be taken up under the title of "Focal infection," and upon the removal of teeth the diagnosis should be changed and the case taken up as admitted with contributory disability (ACD) under "Absence, acquired, teeth."

**FACTS TO BE NOTED ON THE BACK OF THE FORM F CARD IN CASES OF
SUNBURN ATTRIBUTED TO INADEQUATE PROTECTION BY PRESCRIBED
UNIFORM**

When cases of sunburn are recorded and are regarded as resulting from inadequate protection of the uniform prescribed, a note to that effect should be made on the back of the Form F card in order that the cases may be properly coded with respect to causative agent.

**STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF
RECRUITS**

The following tables were constructed with figures taken from monthly reports submitted by boards of review at naval training stations:

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	Number	Per cent of recruits received	Per cent of recruits reviewed
CUMULATIVE DATA FOR JAN. 1 TO JUNE 30, 1925			
All naval training stations:			
Recruits received during the period specified.....	5,889		
Recruits appearing before board of review.....	337	5.72	
Recruits recommended for inaptitude discharge.....	253	4.30	75.07
DATA FOR THE MONTH OF JUNE, 1925			
United States naval training station, Hampton Roads, Va.:			
Recruits received during the month.....	212		
Recruits appearing before board of review.....	6	2.83	
Recruits recommended for inaptitude discharge.....	6	2.83	100.00
United States naval training station, Great Lakes, Ill.:			
Recruits received during the month.....	287		
Recruits appearing before board of review.....	26	9.74	
Recruits recommended for inaptitude discharge.....	19	7.12	73.08
United States naval training station, San Diego, Calif.:			
Recruits received during the month.....	571		
Recruits appearing before board of review.....	72	12.61	
Recruits recommended for inaptitude discharge.....	33	5.78	45.83
United States naval training station, Newport, R. I.:			
Recruits received during the month.....	234		
Recruits appearing before board of review.....	22	9.40	
Recruits recommended for inaptitude discharge.....	21	8.97	95.45

ADMISSIONS FOR INJURIES AND POISONING, APRIL, 1925

The following table indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during April, 1925, is based upon reports reaching the bureau prior to July 10, 1925:

	Admis- sions, April, 1925	Admis- sion rate per 100,000 per annum, April, 1925	Admis- sion rate per 100,000, year 1924
Injuries:			
Connected with work or drill.....	320	3,305	3,148
Occurring within command but not associated with work.....	189	1,952	1,705
Incurred on leave or liberty or while absent without leave.....	72	744	1,004
All injuries.....	581	6,001	5,857
Poisoning:			
Industrial poisoning.....	2	21	21
Occurring within command but not connected with work.....	282	2,913	128
Associated with leave, liberty, or absence without leave.....	287	2,965	175
Total, injuries and poisoning.....	868	8,966	6,032

The unusually large numbers of admissions in April under poisoning titles are for the most part accounted for by outbreaks of food poisoning which happened to occur during that month in the Panama Canal Zone on board the U. S. S. *Wyoming*, with scattered cases in other ships and naval organizations.

Percentage relationships

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or absent without leave	
	April, 1925	Year 1924	April, 1925	Year 1924	April, 1924	Year 1924
Per cent of all injuries.....	55.1	53.7	32.5	29.1	12.4	17.2
Per cent of poisonings.....	.7	12.1	98.3	73.4	1.0	14.5
Per cent of total admissions, injury and poisoning titles.....	37.1	52.5	54.3	30.4	8.6	17.1

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases selected from morbidity reports for the month of April, 1925, are worthy of notice from the standpoint of accident prevention:

Carelessness in the presence of gasoline.—A seaman, second class, who was sleeping in a motor boat heard a dripping noise. He lighted a match to investigate. In the explosion which followed he sustained burns of the face, neck, hands, and ankle, for which treatment on the sick list for 49 days was required.

Careless use of gasoline.—Gasoline was being used in a laundry for cleaning purposes. The vapor was ignited by an electric spark and an explosion occurred. Two men were disabled for 68 days.

Careless handling of gasoline.—A man was smoking and handling gasoline at the same time. He dropped a lighted match into the gasoline. He was on the sick list nine days.

Gasoline explosions continue to be one of the most frequently reported causes of recorded injuries. In almost all cases which have been reported carelessness has been the cause of accident.

Defective chains surrounding a dry dock and inadequate illumination.—A man returning from liberty fell into a dry dock and was killed. The accident occurred at a point where the dock was poorly lighted and where the chain lines at the edge of the dock were defective.

Accidental submergence of a submarine.—Water was being taken into the trimming tanks. Accidentally the boat was permitted to submerge. A man on deck was drawn down by suction. When the vessel had been brought to the surface he was found on deck unconscious. However, efforts at resuscitation were successful. He was on the sick list four days.

Defective ash-hoist cable.—The cable was defective in that a broken wire protruded. While lowering an ash can, a man grabbed the whip and the protruding wire caused a lacerated wound of the hand, which required treatment on the sick list for 13 days.

Defective oil drum.—Compressed air delivered by an air compressor was being used to force lubricating oil out of a drum. The drum exploded and injured one man. He received a lacerated wound of the forehead, for which he was kept on the sick list for six days. The accident was attributed to faulty material. The pressure to which the drum was subjected was not stated.

Defective switch on a dough mixer.—A man was cleaning out a dough mixer, the switch having been turned off. Rolling of the ship caused contact to be made in the switch, parts of which had become loose. The machine started and the man's arm was caught between the side and arm of the mixer. A lacerated wound requiring seven days' treatment on the sick list resulted.

Steam turned on by unauthorized person.—A man was working on the ship's whistle. Steam was turned on by some one unknown. The man at work on the whistle sustained burns of the chest and one shoulder, for which he was treated on the sick list six days.

Lack of eye protection while operating emery wheel.—A flying particle entered an eye. The man was disabled three days.

Lye water mistaken for coffee.—A man drank a cup of lye water in the galley, thinking it was coffee. Chemical burns of the tongue, throat, and stomach resulted.

Fooling with a blank cartridge.—Playing with a blank cartridge, a man placed it on the galley range. The explosion caused a punctured wound of the hand.

Inadequate guard on a drill press.—Wire caught in the revolving spindle of a drill press drew the hand of the man operating the press into the spindle. One finger was avulsed. The man was on the sick list 34 days. The report of accident stated that the drill press was not properly guarded.

Gauge-glass explosion.—It is understood that much thought has been devoted to the prevention of injuries due to bursting gauge glasses. Nevertheless, accidental injuries of this sort continue to occur from time to time. In this instance one man received lacerated wound of the face and body.

Improperly-secured hatch cover.—A man leaned on the hatch and the cover fell on his hand, fracturing a finger.

Carelessness in operating air valve while charging torpedo.—A man thought he was opening the air valve in question. He was closing it. The valve blew off and injured another man. Foreign body in the hand required six days' treatment on the sick list.

HEALTH OF THE NAVY

This report is for the month of July. The summary of health conditions among forces afloat, prepared monthly, is based upon morbidity reports from ships for the month in question received in the Bureau of Medicine and Surgery prior to the fifteenth day of the following month. Few reports for July were received from the battle fleet in time for use in this connection because of the cruise to Australia. Reports were received from 76 per cent of the vessels comprising the scouting fleet.

There is nothing to indicate that there was any noteworthy prevalence of communicable disease in any of the fleets or forces.

Reports from naval stations in the United States show that communicable diseases caused very few admissions to the sick list in July. Twenty-two cases of mumps were notified by the naval training station at Hampton Roads, Va., and 15 by the training station at San Diego, Calif. Only one case of measles was reported.

The following table shows provisional admission rates per 1,000 per annum, entire Navy, for the principal communicable diseases for May, 1925, together with corresponding median rates for the same month, 1920 to 1924, inclusive:

	May, 1920-1924	May, 1925
Cerebrospinal fever.....	0	0.21
Diphtheria.....	0.41	.10
German measles.....	1.88	1.05
Influenza.....	17.16	17.88
Malaria.....	12.89	6.48
Measles.....	3.58	2.51
Mumps.....	19.98	14.43
Pneumonia.....	4.73	3.03
Scarlet fever.....	1.52	1.36
Smallpox.....	.20	0
Tuberculosis.....	3.83	2.20
Typhoid fever.....	0	.10

TABLE NO. 1.—Summary of morbidity in the United States Navy and Marine Corps for the month of May, 1925

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75,943	38,805	19,845	114,748
All causes:				
Number of admissions.....	3,112	1,061	927	5,073
Annual rate per 1,000.....	941.74	606.42	560.54	530.52
Disease only:				
Number of admissions.....	2,724	1,725	814	4,449
Annual rate per 1,000.....	430.43	533.44	492.22	465.26
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	879	547	253	1,426
Annual rate per 1,000.....	136.89	169.15	152.99	149.13
Venereal diseases:				
Number of admissions.....	814	284	185	1,098
Annual rate per 1,000.....	128.62	87.82	111.87	114.83
Injuries:				
Number of admissions.....	353	234	112	587
Annual rate per 1,000.....	55.78	72.36	67.72	61.39
Poisoning:				
Number of admissions.....	35	2	1	37
Annual rate per 1,000.....	5.53	.02	3.02	3.87

TABLE No. 2.—Deaths reported, entire Navy, for the month of July, 1925

	Navy, (strength 95,421)	Marine Corps, (strength, 19,658)	Total (strength, 115,079)
Pneumonia, broncho.....	1	0	1
Tuberculosis, chronic pulmonary.....	2	0	2
Syphilis.....	1	0	1
Other diseases.....	5	2	7
Drowning.....	4	1	5
Other accidents and injuries.....	8	2	10
Poisoning.....	2	0	2
Total.....	23	5	28
Annual death rate per 1,000, all causes.....	2.39	3.05	2.92
Annual death rate per 1,000, disease only.....	1.13	1.22	1.15

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PREFACE

THE UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officers, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

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SPECIAL ARTICLES

THE VITAL CAPACITY TEST

By DAVID FERGUSON, Lieutenant, Medical Corps, United States Navy

Spirometric readings were formerly made as part of the routine physical examination for the naval service. Their value as a diagnostic test or as an index of physical fitness seemed questionable and the test was finally abandoned.

Peabody's studies of the respiration (1) revived interest in spirometry and since 1917 many contributions have been made which have greatly increased our knowledge of the factors influencing the vital capacity of the lungs.

An investigation was undertaken at the Naval Academy to determine if the knowledge gained from the recent studies would warrant the readoption of the test for routine physical examinations.

THE VITAL CAPACITY TEST

The test consists in measuring the maximum amount of air an individual can expel from the lungs following the greatest possible inspiration. It was devised by Hutchinson in 1846 as a diagnostic measure.

The vital capacity is affected by numerous factors, notably age, sex, height, weight, and physical condition and development. It is reduced in practically all intrathoracic diseases, in deformity of the chest, in abdominal disease in which the diaphragmatic excursions are limited, and in severe cases of effort syndrome.

Numerous observers have noted that athletes give relatively high spirometric readings and we have observed that high readings also occur frequently among trained vocalists and musicians who play the various wind instruments.

Hutchinson (2) found that the vital capacity was reduced from 12 to 20 cubic inches (190 to 320 c. c.) following a full meal. This finding was not taken into consideration in our observations and may constitute an important defect in our averages.

MATERIAL STUDIED

An estimation of the vital capacity of the lungs was made on each member of the classes entering the Naval Academy in 1922 and 1923 who was examined by the medical board at the academy. A cursory examination of the data obtained showed that the vital capacities did not fall within the normal zones with the frequency to be expected in such uniform material.

While this material represents a high degree of uniformity in that all the midshipmen are between the ages of 16 and 20; are free from disease and conform to certain minimum requirements as regards physique; yet, great variability in physical development exists. To check this factor, the test was given to each member of the first class during the physical examination prior to graduation.

This group should represent the greatest uniformity obtainable in a body of men. All are between the ages of 20 and 25. They have passed a systematic, graded series of strength tests. For four years they have lived the same kind of life—a life in which every factor conducive to their physical development has been included.

In conducting the test, three trials were given after the test was explained. The highest reading was used. The individual tested was stripped and in the standing position.

NORMAL STANDARDS

Many investigators have suggested different standards for determining, from various external measurements, the amount of vital capacity the normal individual should have.

Hutchinson (2) studied a series of 2,130 individuals and concluded that the vital capacity varied more closely with the standing height than with any other body measurement.

An irregular tendency toward a variation with body weight was also noted. From these observations Hutchinson concluded that the vital capacity increases 8 cubic inches (about 130 c. c.) with each additional inch of standing height in individuals between 5 and 6 feet tall. The averages obtained by Hutchinson for the vital capacity at the different heights are so markedly lower than those obtained by all modern observers that they should not be considered at the present time. His observations on the proportional increase in the vital capacity, however, should still obtain.

Peabody and Wentworth (1) examined 96 normal men and formulated a standard based on standing height. Men above 72 inches tall were found to have vital capacities averaging 5,100 c. c.; those between 72 and 68½ inches averaged 4,800 c. c.; while those from 68½ to 63 inches averaged 4,000 c. c.

Only one instance occurred in which the vital capacity was below 90 per cent of the normal standard, while 86 per cent were within plus or minus of 10 per cent of normal. During their investigation the apparent relationship to weight was also noted, and they obtained even better results when the vital capacity was considered in relation to the surface area of the body.

West (3) investigated in a larger series this latter observation of Peabody and Wentworth and found that a standard based on 2,500 c. c. of vital capacity for each square meter of surface area gave more satisfactory results than any other existing standard for males.

West also suggested, as a more accurate substitute for the height standard of Peabody and Wentworth, the formula of 25 c. c. in vital capacity for each centimeter of standing height.

Lundsgaard and Van Slyke (4) advocated a standard derived from the chest volume. This was estimated from three external measurements of the chest. This standard has not been generally used because of the uncertainty of obtaining uniform chest measurements. Furthermore, the standard was apparently based on insufficient observations, for, when it was applied to larger groups, excessive error was found (3). These observers also studied the extent of the diaphragmatic excursion and emphasized its importance in evaluating spirometric readings.

Dreyer (5), (6) studied a series of normal individuals and came to the conclusion that the vital capacity is a function of weight. He advocated standards derived from body weight, chest circumference, and the sitting height and pointed out the desirability of having different standards for physically active, moderately active, and sedentary individuals.

Hewlett and Jackson (7) studied a series of 400 healthy college men. They derived, by accurate statistical methods, formulæ from the standing height, the surface area, and height-weight.

These formulæ are given in Table 1. They show the surface area standard to be about 1 per cent more accurate than the standing height standard. The height-weight standard is about 1 per cent more accurate than the surface area method.

TABLE 1

This is Hewlett and Jackson's table which shows their formulæ and the relative value of the different constants for calculating the normal vital capacity of the lungs. The table gives the number per hundred having vital capacities falling below the calculated normal capacity in the percentage given in the uppermost line, by the different formulæ. The calculated normal capacity is 100 per cent.

Percentage of normal.....	90	85	80	75	70
Height V. C. = 50 H-4,400.....	21	11.8	5.4	2.2	0.8
Surface area V. C. = 2,900 S. A.-1,000.....	20.1	10.5	4.8	1.8	0.6
Height-weight V. C. = 27 W+31.5 H-3,000.....	19.8	10.2	4.5	1.7	0.6

V. C. = Vital capacity in cubic centimeters.

H = Standing height in centimeters.

S. A. = Surface area in square meters.

W. = Weight in kilograms.

Their excellent height formula, $VC = H \times 50 - 4400$, is particularly interesting, for, expressed differently, it states that the vital capacity increases 125 cubic inches for each additional inch of standing height and calculates the normal capacity for any given height. This is confirmatory of Hutchinson's observation that the vital capacity increases about 130 cubic inches with each additional inch of standing height.

Meyers advocates as a normal standard (8) the body weight in grams multiplied by the factor 0.066.

DISCUSSION OF STANDARDS

The multiplicity of standards is indicative of the defects which are inherent in each one of them.

Standard of Peabody and Wentworth.—This standard has the great virtue of simplicity. It is objectionable, however, because the acute elevations in the calculated vital capacity at $68\frac{1}{2}$ and 72 inches obviously require either too little or too much vital capacity from those on the extremes of the height groups. Furthermore, when applied to larger series, it is impossible to duplicate the remarkably uniform results obtained by the originators of the standard.

Surface area standard of West.—This standard gives very good results in individuals of average build. West shows its striking superiority to the standards of Lungsgaard and Slyke, of Peabody and Wentworth, and to the best formula based on height which he could derive.

The inclusion of body weight as a factor in calculating the normal capacity was substantiated by Dreyer's conclusion (6) that vital capacity is a function of weight.

These views are diametrically opposite to those of Hutchinson, who states that "The effect of weight upon the respiratory system is neither so intimate nor regular as that of height. * * * I very soon determined that the weight did affect the vital capacity, when it became remarkable or in excess. Every ounce of excess weight must, no doubt, interfere with the respiratory system in a certain fixed relation. * * * The vital capacity increases from 7 to 12 stone¹ and then becomes irregular."

¹ 98 to 168 pounds.

Levine (9) had the opportunity to make spirometric observations on a perfectly normal man with an average vital capacity, after a nine-year interval. During this time the subject gained 30 pounds in weight and there was no change in the vital capacity. According to surface area standards the vital capacity, after the increase of weight, would be subnormal, while if the calculation had been made on a height standard it would have remained normal. In event that the subject of these observations becomes obese, Levine predicts that an actual decrease in the vital capacity will occur as the result of limitation of the respiratory movements by the accumulation of large amounts of subcutaneous, mesenteric, omental, and intrathoracic fat.

Hutchinson's and Levine's views were confirmed by Bowen (10), who investigated the vital capacity in a series of obese individuals and found it to be slightly less than normal, using a height standard, but, on using the surface area standard, the vital capacities averaged 20 per cent below the calculated normal.

Wilson and Edwards (13) in a study of the vital capacities of children are most emphatic in denying the value of a weight standard applied to the material. Their accurate statistical work showed that the correlation between vital capacity and standing height is more intimate than between vital capacity and surface area or body weight.

It has been suggested (1) that inasmuch as both surface area and respiration are functions of metabolism, that vital capacity and surface area may be related. Theoretically it is inconceivable that this relationship exists. The ordinary volume of tidal air, i. e., the volume of air respired in normal breathing, amounts to about 500 c. c. per respiration, which is approximately one-eighth of the vital capacity. It would appear then that any increased oxygen requirement of the obese individual would be compensated for by an increase in the amount of the labile tidal air rather than by an increase in the relatively fixed vital capacity, unless the oxygen deficit is made up by an increase in the respiratory rate.

From our material it was possible to select a number of individuals of different heights with surface areas within the same limits, and compare their average vital capacity. If vital capacity is a function of weight or surface area, one would expect the vital capacity of the different height groups to be the same. If vital capacity is dependent on height, each height group should have an average capacity higher than the preceding one.

Chart 1 shows the curve of the average vital capacity at different heights; all individuals charted in each curve have surface areas within the same limits. The several curves definitely ascend from the lesser to the greater heights. A tendency also exists for the curves to flatten out in their middle two-thirds where the greater number of

observations occur, and where a more nearly average physique and conformation is obtained. The several curves also show that a greater vital capacity accompanies a greater body surface in these individuals of average build.

Chart 2 shows the curve of the average vital capacity at the different surface areas; each curve is constructed from individuals within the same height limits. These curves show that the vital capacity increases with the greater surface area. An irregular and slight but definite tendency is apparent for a greater vital capacity

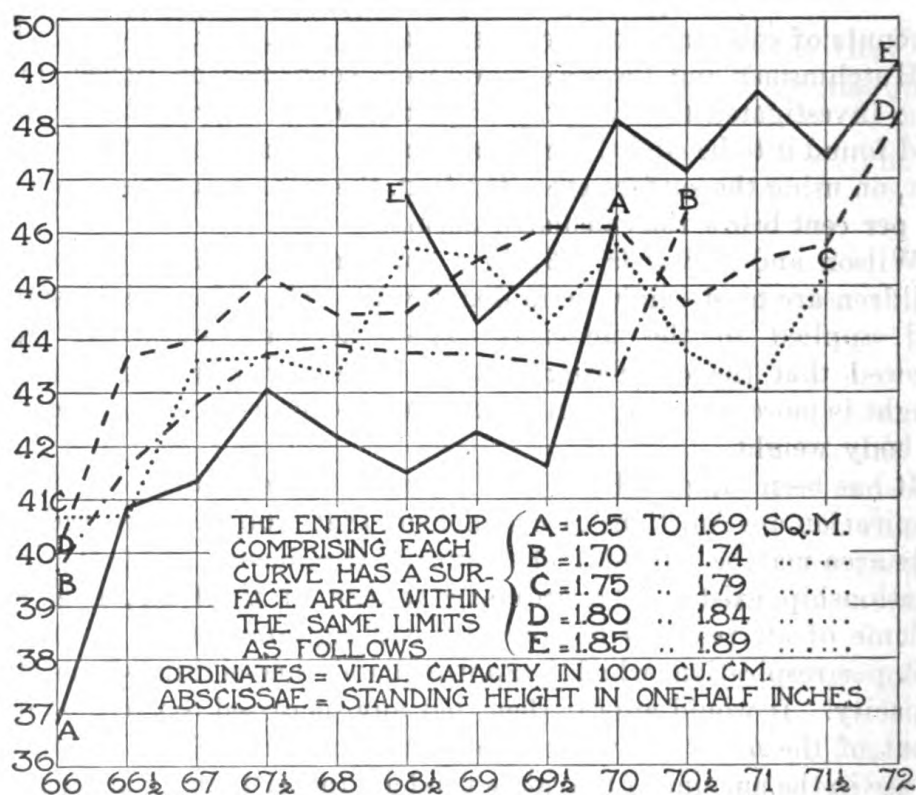


Chart 1

to occur among those having a greater standing height in the same surface area group. Both charts demonstrate the great variation of the vital capacity in homogeneous groups and the limitations of both standards.

For the reason that a surface area standard gives less than 1 per cent greater accuracy (7) in the limited class of individuals of average build, and that the extremes of this class are necessarily arbitrarily placed, this standard does not fulfill the requirements of a standard for general use. Furthermore, the association of weight with vital capacity is theoretically erroneous and has actually been proved so by Bowen's (10) work. A very definite clinical objection to the surface area standard is a false sense of security given by the

relatively high capacity of an emaciated individual. With the weight loss of early tuberculosis the falling vital capacity might not be apparent were the two to parallel. This fallacy would not occur in a standard based on standing height alone.

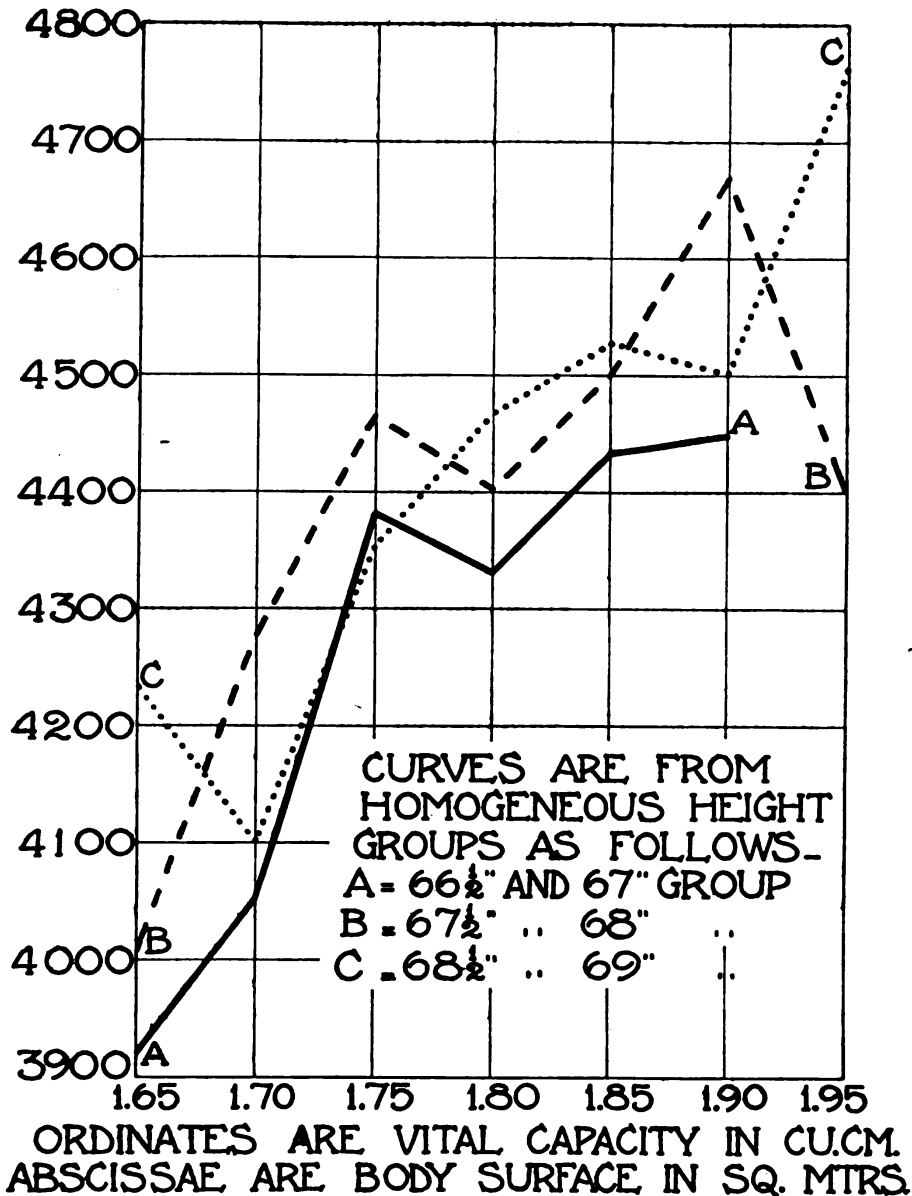


Chart 2

Dreyer's standards.—Professor Dreyer (5) (6) derived a series of formulæ for determining the normal vital capacity from any given stem (sitting) height, body weight, or chest circumference. The formula that he regards as most important calculates the vital capacity from the stem height.

Dublin (14) made a careful analysis of Dreyer's formulæ with West's (3) material. He found almost as marked deviations by the stem-height formula as when the capacity is calculated by Hutchinson's method. This latter method, Dreyer insists, has no value.

Dublin obtained better results with Dreyer's weight formula than with the stem-height formula. Nevertheless, Dreyer regards the latter as more important because, as he points out, the weight may change rapidly, but the stem length does not.

Rodgers (11) compared the value of the stem-height standard with the standing-height formula of Hewlett and Jackson and found the former to have no appreciably superior qualities. This finding is substantiated by the conclusion of Greenwood, Newbold, and Cripps (12), that "The variation of the vital capacity is very great and the substitution of stem height for standing height does not improve the accuracy of prediction and Hutchinson's method is as good or better than its recent modification."

A POSSIBLE EXPLANATION OF THE ASSOCIATION OF BODY WEIGHT WITH VITAL CAPACITY

Hutchinson, Peabody and Wentworth, West, Hewlett and Jackson, Dreyer, and Meyers all noted some degree of relationship between the vital capacity and the body weight. This relationship is also shown in Charts 1 and 2.

The following possible explanation for the association of body weight with vital capacity is offered: As body weight and physical development are rather intimately associated, the latter might be the element responsible for the association of body weight with vital capacity.

Individuals of a normal, and a high normal weight for their height, are usually of a better general muscular and bodily development than the underweight specimen. Therefore any superiority obtained by considering body weight in a standard may be due to the indirect measurement of general physical development through the body weight.

An excellent opportunity existed at the Naval Academy to obtain confirmatory evidence for this supposition. Each midshipman on entering the Academy is given a strength test which consists of registering on a dynamometer the strength of a number of the more important muscle groups. Each muscle group giving a subnormal power response is listed as a physical deficiency. The number of physical deficiencies may be regarded as a fair index to the physical development of the individual.

The number of physical deficiencies in a series of 216 men were examined in relation to their vital capacities. It was found that the

25 men with capacities above 110 per cent of normal averaged 4.4 physical deficiencies; 151 men with capacities within 10 per cent of normal averaged 10.1 physical deficiencies; and 42 men with capacities below 90 per cent of normal averaged 16.1 physical deficiencies.

It would appear then that the superiority of vital capacity standards involving weight is due to the indirect measurement of physical development and strength. These standards would only be superior in the limited class of individuals of normal or average build. The obese give low readings. Tall, thin individuals give variable readings. The overgrown, underdeveloped youth may give rather low readings, while the tall individual of the physique best described as "wiry" usually has a very high vital capacity.

AIDS IN EVALUATING SPIROMETRIC READINGS

Physical development as measured in terms of physical deficiencies can not be used clinically to evaluate an individual spirometric reading. Unfortunately, the importance of this measurement of physical development is only apparent when applied to groups.

A consideration of the athletic or physical activities of the individual in connection with the vital capacity is of interest, in view of the relatively high readings noted in athletes. Accordingly, a group of 100 recruits were questioned as to whether they had been very active, moderately active, or sedentary. The results are given in Table 2. Although this correlation should aid in evaluating the vital capacity reading, it is palpably of no assistance whatever in recruits. These results are substantiated by the observations of Gordon, Levine, and Wilmaers (15) on marathon runners. They found that 17 per cent of these athletes of exceptional endurance and physical development have vital capacities below 90 per cent of normal, using Hewlett and Jackson's height standard.

The determination of the extent of the diaphragmatic excursion would seem to bear an important relation to the vital capacity.

TABLE 2

Vital capacity in relation to history of physical activity

(111 RECRUITS)

	Vital capacity above 110 per cent of normal	Vital capacity within \pm 10 per cent of normal	Vital capacity below 90 per cent of normal
Active.....per cent.....	21	18	41
Moderately active.....do.....	43	54	41
Sedentary.....do.....	36	75	18
Number of cases.....	14	75	22

Keith (16) determined that the volume of the thorax increased 250 c. c. with every centimeter of diaphragmatic descent.

The extent of diaphragmatic movement may be indirectly estimated by percussing out the bases of the lungs at the extent of forced respiration. This method was not tried as it seemed too inexact.

Lundsgaard and Van Slyke (4) determined the limits of diaphragmatic movements by orthodiagraphic methods, using a fluoro-scope. It does not seem that a method for evaluating spirometric readings involving the use of a fluoro-scope will have any clinical value, as the entire thorax may be examined in the time required to measure the diaphragmatic excursion of both sides.

In a group of 500 men the expiratory force and fatigue tests² were made to determine whether a consideration of the vital capacity with the results of these tests, would be of any clinical value. The results are given in Table 3. Apparently neither of these tests aids in evaluating the spirometric reading.

TABLE 3

Correlation of the vital capacity with the expiratory force and fatigue tests

(504 cases)

	Vital capacity above minimum normal		Vital capacity below minimum normal	
	Cases	Per cent	Cases	Per cent
Number passing both expiratory force and fatigue tests	217	49	16	25
Number passing expiratory force test but failing to pass fatigue test	208	47	42	65
Number failing to pass expiratory force test but passing fatigue test	3	1	1	1
Number failing in both tests	11	3	6	9
Total	439		65	

COMPARISON OF HEIGHT STANDARDS

For the reasons given in the discussion of the various vital capacity standards, it appears that only standards derived from standing height alone should be considered. Accordingly, our material was divided into groups for each one-half inch of height. Experience shows that it is impossible to determine an individual's height with less than this amount of error.

The arithmetical mean of the vital capacity was then determined for each group. This average is open to the objection that it may

² The expiratory force test consists in measuring the height to which a mercury column can be blown; 95 mm. of mercury was regarded as a minimum normal.

The lung fatigue test is the determination of the number of seconds that the mercury column can be maintained at 40 mm.; 41 seconds was taken as a minimum normal.

not fairly represent a group if there is too great divergence from the mean within the group.

A weighted average may be the more accurate mean, in that it emphasizes the more frequently occurring values. This is a highly desirable feature because of the great divergence from the mean within our groups. This average may be criticized on the score that the weights assigned are purely arbitrary; therefore, the average approaches accuracy in proportion to the skill of the statistician and the simplicity of the problem.

The value of determining the median was also considered, as this average is less dependent upon the extremes of the series than the arithmetical mean. While it may be typical of a series, it is merely the middle item of a series of items arranged according to size.

The mode, however, is the value occurring most frequently, and around which the other items occur most densely. As an average it is more typical than the arithmetical mean or the median. It may be calculated or determined by inspection.

It was therefore determined to obtain the mode by inspection and present this as an average for each group, together with the maximum variations. These data, with the number constituting each group, the number exceeding, and the number failing to attain the minimum, are given in Table 4. These latter figures are also expressed in percentages.

For comparative purposes the various height standards are shown graphically in chart 3, together with the modes of plebes (recruits) and of first classmen.

Our averages show a general upward trend which is fairly consistent. The irregularities were carefully considered, particularly in the groups large enough to be representative, but the modes could not be changed.

For comparison, the data on the first class, obtained in their physical examination prior to graduation, are given in Table 5. The effects of four years' growth and development on the vital capacity are manifest, but here again the great variability of the vital capacity in this most homogeneous group is shown.

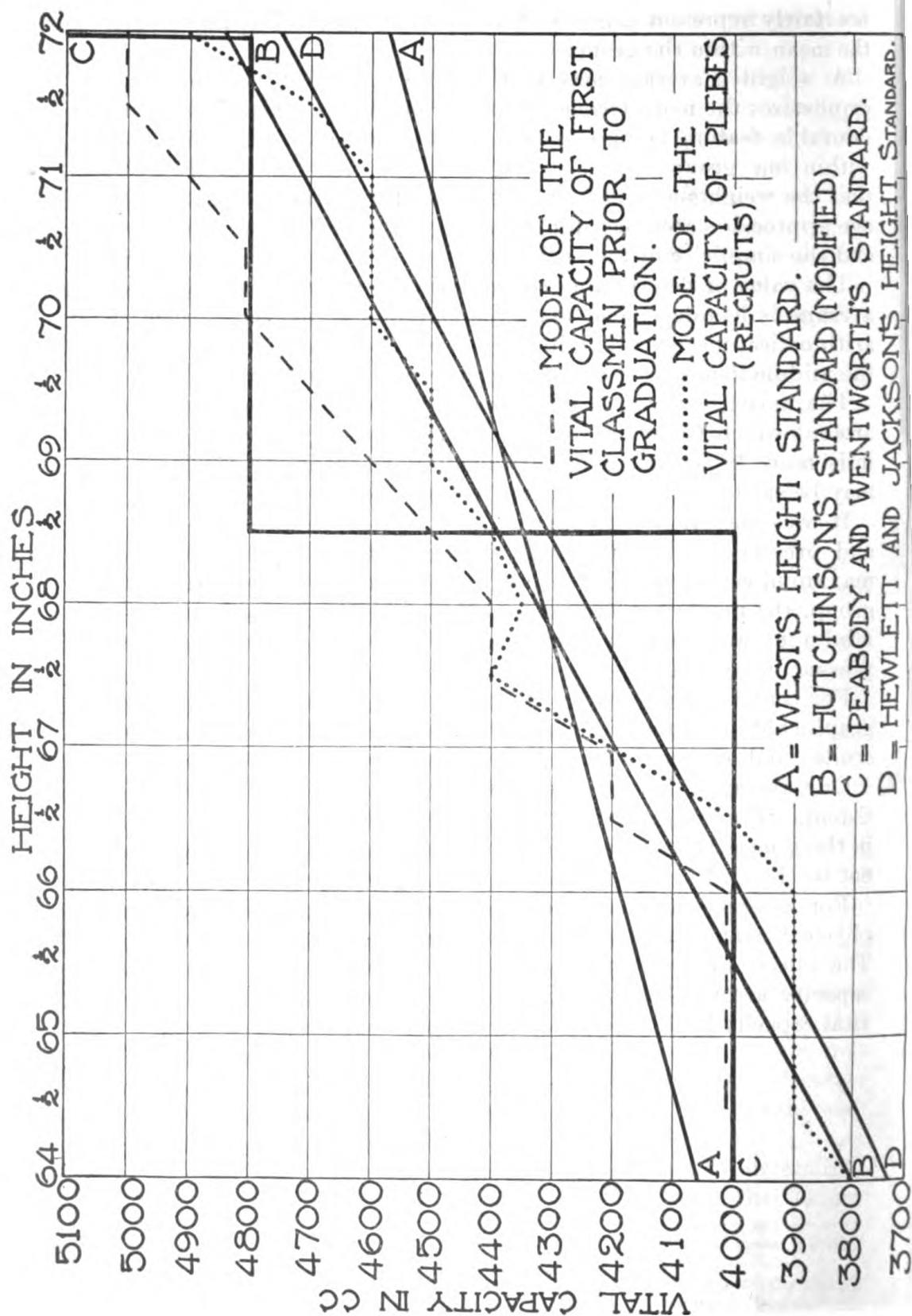


Chart 3

TABLE 4

Data on fourth classmen (recruits)

Height, inches.....	64	64½	65	65½	66	66½	67	67½	68	68½	69	69½	70	70½	71	71½	72	72½ to 78	Total, 1,112.
Number in group.....	14	19	34	30	47	73	81	88	110	95	106	93	86	54	57	33	36	56	
Lowest vital capacity.....	2,400	2,750	3,150	3,100	2,600	3,050	2,400	2,900	3,450	2,800	2,700	3,100	3,100	3,800	3,800	3,300	3,950	3,950	
Highest vital capacity.....	4,100	4,250	4,550	4,550	4,600	4,900	5,400	5,750	5,200	5,400	5,400	5,500	5,900	5,400	6,200	5,750	6,200	6,500	
Mode of the vital capacity.....	3,800	3,900	3,900	3,900	3,900	4,000	4,200	4,400	4,350	4,400	4,500	4,500	4,600	4,600	4,600	4,700	4,900	5,000	
Within ± 10 per cent of mode:																			
Number.....	11	16	25	19	35	50	56	61	90	68	74	66	66	42	37	22	27	43	Total, 808.
Per cent.....	78	84	70	63	74	68	70	60	82	71	73	71	76	80	66	66	75	77	Average, 72.7 per cent.
Below 90 per cent of mode:																			
Number.....	3	3	5	7	11	11	12	13	14	12	20	16	13	8	6	7	6	5	Total, 172.
Per cent.....	21	16	14	23	23	15	15	15	13	12	19	17	15	14	10	21	17	9	Average, 15.4 per cent.

TABLE 5

Data on first classmen (prior to graduation)

Height, inches.....	64½	65	65½	66	66½	67	67½	68	68½	69	69½	70	70½	71	71½	72 to 78	Total, 461.
Number in group.....	4	8	18	16	16	29	47	45	34	30	44	29	38	20	17	53	
Lowest vital capacity.....	3,600	3,200	3,400	3,400	3,400	3,700	3,400	3,700	3,500	4,000	3,500	4,100	4,000	4,100	4,000	4,000	
Highest vital capacity.....	4,400	4,400	4,850	4,600	4,600	5,600	5,300	5,600	5,200	5,300	5,800	5,600	5,600	6,000	6,000	6,500	
Mode of the vital capacity.....	4,000	4,000	4,000	4,000	4,000	4,200	4,400	4,400	4,500	4,600	4,700	4,800	4,800	4,900	5,000	5,000	
Within ± 10 per cent of mode:																	
Number.....	4	7	15	14	14	20	34	35	28	20	33	22	25	17	10	44	Total, 350.
Per cent.....	100	87	83	87	87	70	72	77	84	66	75	77	67	85	59	83	Average, 75.8 per cent.
Below 90 per cent of mode:																	
Number.....	0	1	1	1	1	3	5	4	4	4	6	5	8	2	4	3	Total, 52.
Per cent.....	0	12	6	7	7	10	10	9	12	13	13	17	21	10	24	5	Average 11.2 per cent.

TABLE 6

Comparison of the average body weight and the average number of physical deficiencies between the first and fourth class men at the points of coincidence of the modes of their vital capacities and at the points of their greatest divergence

	At 67 and 67½ inches, where the vital capacities of recruits and graduates are the same	At 70 and 70½ inches, where there is a difference of 200 c. c.	At 71 and 71½ inches, where there is a difference of 300 c. c.
Average weight of first-class group.....	144.8	154.4	157.6
Average weight of fourth-class group.....	133.5	142.4	148.5
Average number of physical deficiencies in fourth-class group.....	11.8	13.8	12.1

The first class have no physical deficiencies.

At the 67 and 67½ inch heights the modes of the two groups are the same; while at the 71 and 71½ inch heights they are farthest apart. Table 6 was constructed to determine whether body weight or physical development was the responsible factor. Examination of the table shows that body weight is not the factor, as the two 67-inch groups have a difference of 11½ pounds in average weight while the 71-inch groups have a 9-pound difference. Physical development as measured in terms of physical deficiencies is suggestive but inconclusive because a greater number of deficiencies occur in the 70-inch groups, whose average vital capacity difference is less than that of the 71-inch groups.

Chart 3 shows that, graphically expressed, the mode of the vital capacity of recruits parallels with remarkable fidelity the course of Hutchinson's standard. A curve that is as near coincidental as may be obtained from biological material results when Hutchinson's finding of the proportional increase in vital capacity per inch of standing height is applied; a vital capacity of 3,800 c. c. being considered the average for a height of 64 inches. Hewlett and Jackson's, Peabody and Wentworth's, and the Naval Academy averages furnish sufficient justification to consider the average capacity for this height to be about 3,800 c. c.

Chart 4 shows the modified Hutchinson's standard. This chart also gives the per cent of normal of any individual reading. The lines are extended to the 60-inch and the 75-inch heights for, although sufficient cases were not available below 64 and above 72 inches to determine the average capacities, it is fair to assume that the normal capacities for these heights are sufficiently close to that plotted for all practical purposes.

The value of this standard for individuals above 25 years of age is open to conjecture. Dreyer's statement has been generally accepted that there is no appreciable decrease in the vital capacity until the age of 50 is attained. On the other hand Hutchinson found the vital capacity increased until the age of 30 and from 30 to 60 years there was a decrease of 7 cubic inches (112 c. c.) for each 5 years.

It does not appear that a consideration of any of the factors examined can give appreciably better results in calculating the normal capacity of an individual than the standing height alone.

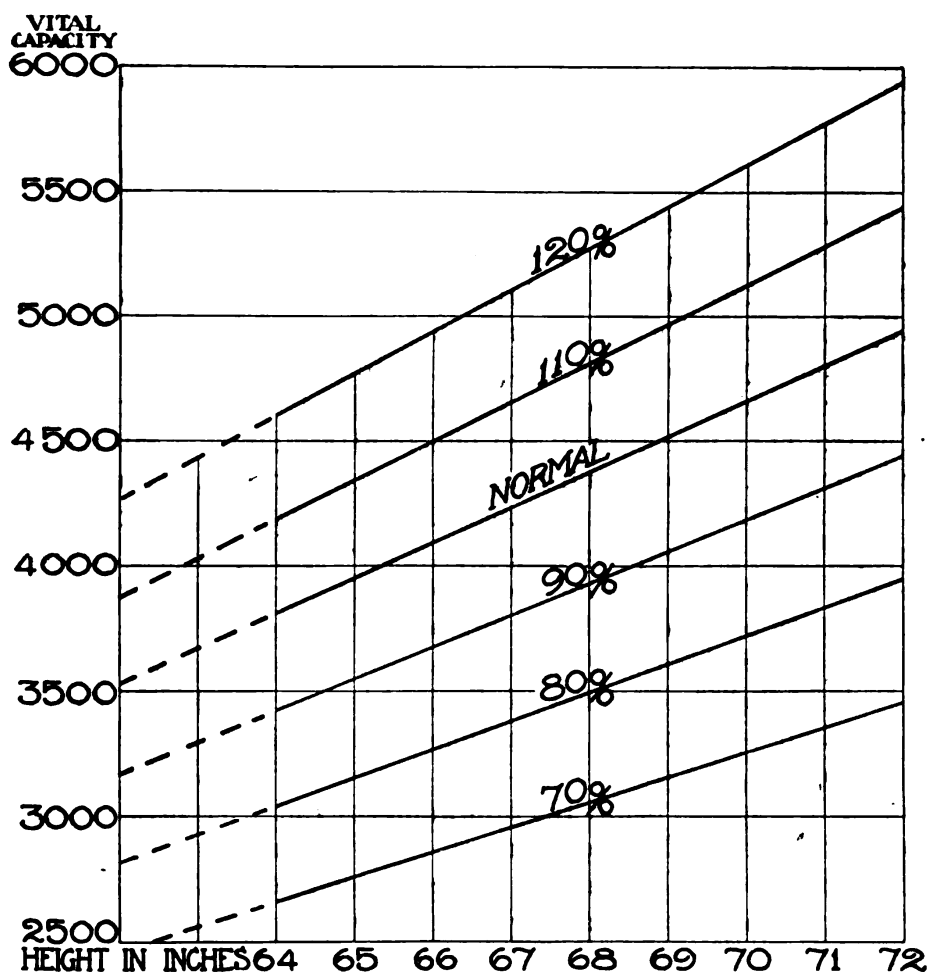


Chart 4

THE CAUSE OF THE VARIATION OF THE VITAL CAPACITY IN HOMOGENEOUS GROUPS

The cause for variable vital capacities in homogeneous groups evidently lies in the diaphragmatic function. Lundsgaard and Van Slyke (4) called attention to the importance of considering the extent of the diaphragmatic excursion in connection with vital capacity estimations.

Dr. T. R. Healy, of Boston, Mass., very kindly allowed me to examine 84 diaphragmatic tracings taken from his private practice. These tracings were made by orthodiagraphic methods, and they show the position of the diaphragm at the extremes of normal and forced respiration.

The diaphragmatic excursion was measured at the extremes of forced respiration, and it was found to vary from 1.6 to 11 cm. The variation in the shapes and relations of the diaphragmatic shadows was even more striking than the extreme difference in the excursions. Some diaphragms pursued an almost horizontal course adjacent to the heart, while others were at an angle approaching 45 degrees. It appeared that the thoracic volume should be increased infinitely more where the diaphragm occupied the more horizontal position.

THE CLINICAL VALUE OF SPIROMETRY

Spirometry is largely without any diagnostic value in heart disease. The vital capacity is reduced when decompensation ensues, but the characteristic and striking signs of congestive heart failure usually do not require spirometric confirmation.

In pulmonary disease, particularly incipient or quiescent tuberculosis, very valuable evidence may be obtained from this test.

Shepard (17) investigated the effects of certain past diseases on the vital capacity and found that those groups in which there was a past history of influenza or pneumonia showed a slightly lower capacity. In the groups having a past history of pulmonary tuberculosis or pleurisy a definite and apparently permanent lowering of vital capacity occurred in the group as a whole.

A review of the Naval Academy records showed that 19 midshipmen had developed pulmonary tuberculosis since 1912. Of these 19 men, 10 had spirometric estimations made within a year of the development of the disease; 7, or 70 per cent, of these 10 men had spirometric readings below the minimum for their height, i. e., below 90 per cent of the calculated normal. These figures are all the more striking because at the time of the spirometric observation the men had chest examinations made by at least two experienced examiners and no evidence of tuberculosis was found.

While our series of tuberculous individuals is very small, the percentage with low vital capacity readings is in startling contrast to the percentage of low readings in normal individuals. Despite the smallness of the series, it would appear possible that about 70 per cent of those recruits who will develop tuberculosis within a year will fail to register by spirometer the minimum vital capacity for their height.

The value of the test, then, would seem to be merely that of focusing the attention of the examiner on this particular group of men. Even though the family, past, and environmental history and the physical findings are negative for tuberculosis, it would appear that a routine X-ray examination of the chest should be required in all cases failing to pass the test.

Obviously the spirometric test can in no way replace physical examination of the chest. Its relative value as a diagnostic aid is probably less than that of a carefully taken personal and family history.

Repeated at regular intervals, the test should be particularly valuable in any activity having a high admission rate for tuberculosis. The normal vital capacity of the individual could be determined and charted and any persisting decrease immediately investigated.

SUMMARY

The various standards for calculating the vital capacity of an individual are discussed.

Evidence is presented indicating that a standard based on standing height alone is superior for general use.

Hutchinson's standard, with 3,800 c. c. regarded as the average vital capacity at 64 inches, was found to be more accurate than any of the other standards examined.

Physical development, physical activity, and the tests for expiratory force and endurance are considered in conjunction with the spirometric readings and do not give appreciable aid in evaluating an individual's vital capacity.

A small series of spirometric observations on individuals who developed pulmonary tuberculosis within a year of the observation, shows 70 per cent to have spirometric readings below 90 per cent of the average.

The mode of the vital capacity of 1,112 normal recruits, grouped according to height, is compared with the same data in 461 midshipmen prior to graduation. Both modes are compared with the various height standards.

The maximum variations from the mode in both groups are given, together with the number within 10 per cent of the mode, and the number failing to attain 90 per cent of the mode. These latter figures are also expressed in percentage.

CONCLUSIONS

The vital capacity test is of only relative value as a diagnostic aid in detecting pulmonary tuberculosis.

It has, however, sufficient value to warrant its adoption as a routine recruiting test. It should be of inestimable value as a periodical test in any activity where the tuberculosis admission rate is high.

A modification of Hutchinson's standard for calculating the normal vital capacity is recommended. This standard is graphically shown in Chart 4.

The necessity for this investigation was suggested independently by Dr. S. A. Levine, of Boston, Mass., and Capt. D. N. Carpenter, Medical Corps, United States Navy. From an extensive experience with spirometry, these observers were impressed by the relatively great influence of height, per se, on the vital capacity, and consequently were reluctant to accept spirometric standards involving weight. It is a pleasure to acknowledge the many helpful suggestions made by them and by Lieut. Commander W. M. Kerr, Medical Corps, United States Navy.

I am also greatly indebted to Lieut. H. L. Maples, United States Navy, of the department of mathematics, United States Naval Academy, and Lieut. (Junior Grade) J. A. Snackenberg, United States Navy, for mathematical assistance.

Lieut. E. B. Taylor, Medical Corps, United States Navy, formerly gymnasium medical officer at the Naval Academy, very kindly collected a series of some 200 spirometric readings on athletes. It was proposed to incorporate Doctor Taylor's findings in this article, but as his results were substantially the same as those already published by Gordon, Levine, and Wilmaers (15), they are not repeated here.

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**EXPEDITING THE DIAGNOSIS OF SYPHILIS BY THE EMPLOYMENT OF
THE KAHN PRECIPITATION TEST¹**

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INTRODUCTION

Present-day methods for the serum diagnosis of syphilis may be divided into three classes: (1) The various modifications of the Wassermann test; (2) the several precipitation tests, excluding the Kahn; and (3) the method proposed by Kahn.

The various modifications of the Wassermann test.—Although there has appeared a massive amount of literature on the Wassermann test, there has been little advance in the fundamental knowledge of the test since 1908, when Landsteiner and his associates showed that alcoholic extracts of normal tissue may be used as antigen. The literature on the Wassermann test deals almost exclusively with technique—whether or not to use an antishoop, human, ox, or other hæmolytic system; whether or not to titrate the complement; or which antigen to use in preference to the other. In spite of the voluminous literature there is as much difference of opinion to-day with regard to the technical phases of the Wassermann test as there was in 1912, when Besson in his book stated, "Space will not allow description of all the modifications of Wassermann's method which have been introduced."

Many attempts have been made to standardize the Wassermann test. Yet, after all these attempts, including the more recent standardization studies of Kolmer, there is a movement among serologists to try all over again. Assuming that a standardized Wassermann system could be worked out, the final method is bound to have the

¹ From the laboratories of the U. S. Naval Medical School, Washington, D. C.

sources of error inherent in a test built up on five biological reagents, each variable in character. Briefly, the Wassermann test reached a "dead level" many years ago and the development of a truer knowledge of syphilis appears to lie in the realm of tests more simple than the Wassermann.

Precipitation tests other than the Kahn.—Little may be said regarding the earlier procedures based on precipitation reactions occurring in mixtures of serum from syphilitics and antigen. Levaditi and Roche connected the fixation of complement with the phenomena of precipitation and state that during an attack of syphilis the "serum becomes enriched in certain colloidal principles which in the presence of lipoids and bile salts are easily precipitated, and so fix the hæmolytic complement." The Meinicke, Sachs-Gorgi, and Dreyer and Ward's Sigma tests, based on precipitation, have received considerable attention, but all require incubation periods of variable lengths of time, which render them impractical. This was apparently recognized by both Meinicke and Sachs. The former has since replaced his regular method with a "turbidity" test, and the latter, with Klapstock, recently published a method in which benzoin is added to antigen and which requires but three hours' incubation. The value of these two methods is still to be determined. The Sigma reaction of Dreyer and Ward has the inherent difficulties of the Sachs-Gorgi and Meinicke methods. When preparing antigen for this method, for example, an associate worker found it necessary to prepare six antigens to find one satisfactory.

The Kahn precipitation test.—When turning to the precipitation system proposed by Kahn we enter into a different realm. Kahn for the first time made a study of the fundamental principles governing precipitation with syphilitic sera and as a result has evolved a test which stands out as the most comprehensive in this field. Briefly, Kahn first pointed out the importance of the concentration of the ingredients in precipitation in syphilis; second, the requirement for a highly sensitive antigen dilution; third, the necessity for proper quantitative relations between serum and antigen; fourth, the laws governing sensitiveness of antigen and the importance of standardized uniformity in antigen preparation; fifth, the necessity for agitation or shaking of the ingredients.

As a result of these studies, Kahn was able to eliminate from his method the usual requirement for incubation. Workers who employ incubation at all in the Kahn reaction, limit it to 15 minutes. Kahn was further able to remove from his method numerous pitfalls for error inherent in practically all known tests for syphilis. Furthermore, aside from the diagnostic procedure usually spoken of as "the routine test with serum," the test offers a "spinal fluid

procedure," a "special quantitative procedure," of particular value in treated syphilis and a "presumptive procedure" of higher sensitiveness than the routine which is used by some syphilologists as a criterion for cure.

The Kahn test at the United States Naval Medical School.—Although the Kahn test has been studied from time to time at the Naval Medical School for the past two years, active interest in the test may be said to date from early in May, 1925. At that time, through the efforts of the commanding officer of the school, Doctor Kahn demonstrated the test before a group of officer students and invited guests. Ten unknown serums were given to Doctor Kahn and after discussing the theoretical phases of the test he permitted himself about 20 minutes in which to examine the 10 sera. On comparing the results with those given by two separate modifications of the Wassermann test—the Noguchi and Kolmer—it was found that nine sera checked completely. The remaining serum came from a case of neurosyphilis under treatment and gave a doubtful reaction with the Noguchi and an anticomplementary reaction with the Kolmer, while the Kahn gave a two-plus reaction. This simple method thus appeared superior to two separate technical modifications of the Wassermann test.

It was clear from this demonstration that the Kahn test possessed unquestionable promise as a method for the serum diagnosis of syphilis. It seemed further that a test such as this should prove ideal for use in the medical department of the Navy, particularly aboard ship and in laboratories removed from medical centers. Indeed the Surgeon General surmised this possibility some time ago and, at his request, the test was used on board the U. S. S. *Henderson*. The results published in the U. S. NAVAL MEDICAL BULLETIN by Lieut. Commander Parham and Lieutenant Behrens of the Navy, speak highly in favor of the Kahn test on board ship.

Standard Kahn antigen.—Although the Kahn test was used with success in the Naval Medical School, there was still to be determined whether the antigen used in the test was of a sufficiently standard character. One of the main difficulties with the various Wassermann tests, as with the several precipitation tests, such as the Meinicke, Sachs-Gorgi, and Sigma tests, is the variable character of the antigen. Several lots of antigen may be prepared under identical conditions, nevertheless the results obtained with these antigens when employed with serum will frequently be highly variable. It was therefore desired to determine whether various lots of Kahn antigen prepared according to standard directions will be similar in their sensitiveness with serum. This was of especial importance in the use of the Kahn test in the Navy, since it was desired that the

Naval Medical School serve as a central laboratory for the preparation and distribution of antigen.

About 600 mls of standard Kahn antigen prepared at the Naval Medical School gave excellent results in the Kahn test. It was desired to further establish the standard quality of this antigen. A small amount was thereupon mailed to Doctor Kahn at Lansing, Mich., with the request that he examine it. Doctor Kahn's reply was that the antigen gave results comparable with the standard antigen prepared at Lansing. More recently Doctor Kahn spent 10 days at the Naval Medical School at the request of the Surgeon General. About 1,500 mls of antigen was prepared during Doctor Kahn's stay. The 600 mls previously prepared was mixed with it and titrated. The results of this titration indicated that it should be used in the test in the proportion of 1 mil of antigen plus 1.1 mls of saline for the serum reaction and 1 mil of antigen plus 1.3 mls of saline for the spinal fluid procedure.

It was further desired to find out how the Kahn antigen prepared at the Naval Medical School would behave when compared with the standard Kahn antigen prepared at Lansing. Ten serums were chosen for this experiment; four giving negative reactions as controls, three giving weak reactions, and three giving strong positive reactions. Each serum was tested with the Naval Medical School antigen and with the Lansing antigen. In testing the first seven serums, the routine Kahn test was used, while in testing the last three stronger sera the quantitative Kahn test was employed. This, in order to obtain a fine quantitative differentiation between the behavior of the two antigens.

The results obtained were as follows:

Serum No.	Results with Naval Medical School Kahn antigen	Results with Lansing-Kahn antigen
1-4.....	Negative.....	Negative.
5.....	3 plus.....	3 plus.
6.....	do.....	Do.
7.....	1 plus.....	Doubtful.
8.....	40 units.....	40 units.
9.....	200 units.....	200 units.
10.....	20 units.....	20 units.

It was clear from this finding that the claims made by Kahn with regard to the standard quality of his antigen are correct.

This, in our opinion, is of greatest importance in connection with the establishment of the test in the Navy. Indeed, it is believed that this standard quality of the Kahn antigen will help establish the test throughout the world as a substitute for the Wassermann.

THE KAHN TEST AND ITS INTERPRETATION

Three different procedures have been employed with success at the Naval Medical School. (1) The routine test with serum, (2) the spinal-fluid procedure, and (3) the quantitative procedure.

The routine test with serum.—This is a three-tube test, each tube containing a different proportion of serum and antigen dilution. The final result is the average of the findings with the three tubes. Thus, if all three tubes show complete or four-plus precipitation, the final result is four plus. If only one of the tubes gives a four-plus precipitation reaction, the final result is four divided by three, or one plus.

The reduction of the final result to a third of the original readings renders the routine test a conservative diagnostic procedure. It is well to remember, however, that this test is more sensitive than the Wassermann in early primaries and particularly in cases undergoing treatment. It is not uncommon for a treated case to show a positive Kahn and a negative Kolmer. The difficulty with the negative Wassermann is its lack of permanency, frequently becoming positive again in due time. In this regard the Wassermann may be misleading in so far as a negative reaction often leads to discontinuance of treatment.

The spinal-fluid procedure.—Kahn was the first to propose a test for spinal fluid based on precipitation. Although we have been getting good results with spinal-fluid tests, it was of special interest and value to see the test demonstrated by Doctor Kahn during his stay at the Naval Medical School. As an illustration of the applicability of the Kahn test for spinal fluids two brief protocols of spinal-fluid examinations will be presented.

Doctor Ashby, serologist to the Government Hospital for the Insane, Washington, D. C., brought to the Naval Medical School six spinal fluids for examination. Four fluids were from cases of neurosyphilis. One of these four fluids was anticomplementary in the Wassermann test and another was heavily contaminated. These four gave positive Kahn reactions. The remaining two fluids coming from nonsyphilitic patients gave negative Kahn reactions. In view of the preliminary steps necessary in the spinal-fluid test, it required about an hour to complete these reactions.

The second protocol was of particular interest. Profs. O. B. Hunter and Tomás Cajigas of the Department of Bacteriology and Pathology, George Washington University Medical School, desired to know what type of reactions the Kahn test would give with spinal fluids from two to eight months old. The clinical records of these fluids were as follows:

Spinal fluid No. 1: From case of tubercular meningitis, eight months in ice box.

Spinal fluid No. 2: From case of paresis—Wassermann anticomplementary, three months in ice box.

Spinal fluid No. 3: From case of neurosyphilis—diluted with salt solution before performing Kahn test, two months in ice box.

Spinal fluid No. 4: From case of neurosyphilis, six months in ice box.

Spinal fluid No. 5: From case of cerebral hemorrhage—slightly tinged with haemoglobin, four months in ice box.

Kahn tests on these five spinal fluids were made at the Naval Medical School with a clinical accuracy of 100 per cent, and a check of this kind on old fluids demonstrates the dependability of the Kahn spinal-fluid procedure over all of the tests now in use.

The quantitative procedure.—The routine Kahn test and the spinal-fluid procedure are given in outline form in the "Technique of the Kahn Precipitation Test employed in the Medical Department, U. S. Navy," distributed by the Naval Medical School. The quantitative procedure was not included because it was desired not to complicate the test for those not familiar with it. In our opinion, however, the quantitative procedure is an important adjunct to the series of procedures which make up the Kahn precipitation system.

The procedure is built on the basis of syphilitic reacting units (Kahn units) in serum and is of particular value in cases undergoing chemotherapy. To illustrate: A series of serum reactions in a year after several courses of treatment may all be four plus in the routine test and of course give no clue to the clinician as to the serologic effect of the treatment. The quantitative procedure may give for example, in this series of serum reactions, 400 units, 200 units, and 60 units, respectively, thus showing a marked effect of the treatment.

It is recommended, therefore, that whenever facilities are available, quantitative procedures be run on all serums giving four-plus reactions with the routine test.

INTERPRETATION OF THE KAHN TEST

As in the case of the Wassermann reaction a positive Kahn reaction should be taken as a single manifestation of syphilis. When clinical evidence and history are negative the test should be repeated to eliminate the possibility of technical error. Repeated Kahn positive reactions in a given case are highly suggestive of syphilis which careful search will frequently bring to the surface.

A negative Kahn, like a negative Wassermann, does not absolutely eliminate syphilis.

In the case of the spinal-fluid reaction, our experience indicates that it is highly specific for neurosyphilis.

APPLICATION OF THE KAHN TEST IN THE UNITED STATES NAVY

In applying the Kahn test in the medical department of the Navy the general plan is as follows:

1. Unit outfits consisting of racks, test tubes, and the necessary pipettes for performing the test are supplied to the various activities by the United States naval medical supply depot, Brooklyn, N. Y. In this manner all equipment supplied is of a standard nature.

2. Standard Kahn antigen, titrated and ready for use, both with serum and spinal fluid, and an outline of technique of the test is furnished by the Naval Medical School on request.

3. Wherever Wassermann tests are available the Kahn test should be employed side by side. Wherever no facilities for performing Wassermann tests exist, the Kahn test should be performed alone.

SUMMARY

The Kahn test appears to possess superior qualities over the Wassermann reaction and the various precipitation procedures now in use, and should be especially applicable in the medical department of the United States Navy.

Some of the outstanding features of the Kahn test are:

1. It offers a standard and stable antigen which can be readily prepared in a central laboratory for supplying other laboratories.

2. It offers a diagnostic procedure with serum, the specificity of which with serum has not been questioned by a large number of workers.

3. The spinal fluid procedure appears to be superior to any test available at this time, being neither influenced by contamination nor by anticomplementary properties.

4. The Kahn test further offers a quantitative procedure which is of especial value as a check on treatment.

5. None of the procedures of the Kahn test require incubation; all reactions being completed on mixing the ingredients and shaking for a few minutes. This renders it possible to obtain the results of the Kahn test at any time instead of the usual once or twice a week serologic examinations.

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SURGERY OF THE BLADDER¹

LOCAL ANESTHESIA TECHNIQUE

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A study of the anatomico-physiological changes and pathologic physiology of the urinary organs covering a period of many years, has convinced us of the utility of regional anesthesia in operations on that viscus. In fact, in many cases it has become an absolute necessity in bladder operations, rather than a mere useful measure. The development of modern methods has now brought these techniques well within the range of the average surgeon. This means not only an increasing popularity of the method but, what is far more important, a great reduction in operative mortality. It is our intention in this brief paper to sketch the origin of the procedures and the methods we have been employing successfully in their performance.

HISTORY

Bladder operations can not really be classified as ancient procedures. Desnos (1) tells us that among 9,000 Egyptian mummies examined, although there was much evidence of urological disease such as calculus, tumor, etc., there was not a single perineal or hypogastric scar indicative of operative interference. Neither are there any records of it among the writings of the early Egyptians or Hindoos. Kirwin (2) in his careful researches found no evidence of these operations among the early Hebrews. That race we learn were at that time hygienists rather than surgeons.

The surgical opening of the bladder received its first real description (in the method of John Romanes) by Mariano, a Neopolitan surgeon, in 1535. This was a perineal cystotomy, but apparently some of the early *sectio altas* are confused with that operation. The first suprapubic cystotomy was performed by Pierre Franco for the removal of a stone which he could not extract by the perineal route.

The first suprapubic operation for rupture of the bladder was performed by Samuel D. Gross in 1851. Suprapubic operations were, however, first placed on a scientific basis by Sir Henry Thompson, of England, in 1880. This was followed by the bladder resections of Sonnenberg in 1881. The progress of successful bladder surgery, aside from the works of Guyon, Vonantal, Czeny, and Rydygier, has been rather slow until the epoch-making contributions of Voelcker (3) on deperitonealization of that viscus.

¹ Read before the Eastern Clinical Society, New York, May 20, 1925.

The early history of local anesthesia in bladder operations is somewhat nebulous. It, however, seems to have been placed on a scientific basis by Hackenbruch (4), of Wiesbaden, in 1897. This was followed by its use in the clinics of Willms, Narath, Bier, Braur, Eiselsberg, Illyes, and others. In the Illyes clinic, at Budapest, all bladder operations have for several years been performed under local anesthesia. This is also true of the Brady Urological Foundation of the New York Hospital. Schnetzer, of Chicago, formerly of Budapest, reports 1,690 urological operations under regional anesthesia, including many bladder lesions. His great success is due to his wonderfully developed technique. It is gratifying to note the attention now being given to this subject, particularly by Lowsley (5), Farr (6), Barringer (7), Kolischer (8), Alfred Jones (9) of Chicago, Schnetzer (10), Labat (11), and others.

INDICATIONS AND CONTRAINDICATIONS

In presenting this brief paper, it is not our intention to insist that all operations on the urinary bladder should be performed under local anesthesia, or that all narcosis is dangerous. Under the ideal circumstances of a generally healthy patient, with a good anesthetic medium, inhalation anesthesia is ordinarily a safe procedure.

There is, however, another and a very well defined picture which is commonly presented to those of us doing urological surgery. During a long period of years we have been impressed by the fact that patients suffering from urinary disorders do not present themselves until seriously inconvenienced by their disease. This is also the experience of other large clinics as noted by Judd, Lowsley, Crowell, and others. Our patients are frequently suffering from repeated acute retention or the evidence of chronic urinary obstruction, at times extending to the pyelovenous back flow, so splendidly described by Hinman (12). Frequent trigonal hypertrophy also causes at times a marked toxemia, to which attention has been called by the studies of Watson (13).

In a large proportion of these cases, the renal function is at a low ebb, while the blood urea is comparatively high. An examination of the urine shows considerable albumin, pus, and casts. Associated with these conditions, but beyond the urinary tract, there is usually the evidence of the cardiorenal syndrome, as manifested by emphysema, arteriosclerosis, hypertension, and myocarditis. The aforementioned facts are those which led Laewen to his pioneer work in local anesthesia of the urinary organs.

Aside from the picture just sketched, we have also to consider the advanced age of many of these patients and their greatly diminished reserve force. Here we have a vitally important factor, which must

influence us in the choice of anesthesia. In perhaps no other class of patients will the baneful effects of narcosis be so pronounced as happens at times in maladies of the urinary tract. Having noted the principal indications for the use of local anesthesia, you will naturally ask, What are its contraindications?

There are but one or two factors which militate against its use. They are, first, the absence of one who is experienced in the use of this technic; second, the speed mania, as local anesthesia is in nowise compatible with haste. It is extremely difficult, in fact well-nigh impossible, except in a few instances, to anesthetize against pulling and tearing. Great care and gentle handling of the tissue will aid greatly in opening the gates of success.

CHOICE OF AN ANESTHETIC

Many drugs have been employed in bladder anesthesia. Cocaine is highly toxic, and we will content ourselves with its mere mention. We have found neocaine most useful, and its action is uniform. In considering the drug to be used, heed should be given to the following points:

1. The substance must be less toxic than cocaine.
2. The agent must not cause irritation or tissue injury.
3. It must be soluble in water, and the solution be stable and possible of sterilization on boiling.
4. It should be able to penetrate rapidly.

METHOD OF ADMINISTRATION

It has been our custom for some time to employ the excellent syringes and needles designed by Doctor Labat, and neocaine as the anesthetic agent. There is still much discussion as to the preparation of the anesthetic. As you will remember, Laewen, in his early experiments, found that by the use of sodium bicarbonate an increased diffusion was obtained. Many surgeons of prominence believe that a small amount of suprarenin should be added, in addition to the bicarbonate. Braun, Labat, Illyes, Jones, and others are included in this group. On the other hand, Lowsley (14), Meyer (15), and Schmidt (16) hold that suprarenin increases the toxicity.

Our belief, based on a large clinical experience, convinces us that best results are obtained from a freshly prepared 1 per cent solution of neocaine. Some of our associates believe that better results are obtained with larger amounts of a one-half of 1 per cent solution.

PREOPERATIVE MEDICATION

Preparation for anesthesia is essentially that of other urologic procedures. No preliminary narcotization in the form of morphia, scopolamin, or other sedative drug is employed, except in the highly nervous type of patient. This class, however, is not well adapted to local anesthesia.

Forty-eight hours before operation the patient is given 30 grains of sodium bicarbonate. If the gastrointestinal tract is disturbed, he is given a 5 per cent solution of the drug by rectum. Twenty-four hours before operation the patient receives a purgative, and he is allowed to have as peaceful a night as possible before operation. If the renal function is found to be not good, the operation is postponed.

ANESTHETIC METHODS

In surgery of the bladder we may apply our anesthesia in the form of:

1. Terminal or infiltration anesthesia.
2. Field block.
3. Sacral anesthesia, usually combined with one of the former.
4. Spinal anesthesia.

Close observation of many cases has convinced us that it is to the best interest of the patient to have our infiltrations as far as possible from the large nerve centers. With this idea we have endeavored to utilize as far as practicable the terminal and field block methods. Spinal anesthesia is extensively used, particularly by Chute (17), Babcock (18), Rytina (19), Tolson, and others, with excellent results. We have, however, not been so fortunate, nor have our associates, in the avoidance of unpleasant incidents in connection with spinal anesthesia.

OPERATIVE PROCEDURES

In view of the length of this program, we shall eliminate the technique of cystoscopy and intravesical manipulations and consider at once the major procedures of bladder surgery.

SUPRAPUBIC CYSTOTOMY

In practically every operation involving an opening of the bladder by the suprapubic route we resort to the use of local anesthesia. In experienced hands the lack of postoperative shock and the absence of any irritating effects on the urinary apparatus, particularly the kidney, is sufficient justification for its use. We employ

several forms of local anesthesia, depending largely on the nature of the operation, as follows:

Infiltration anesthesia may be utilized by means of the layer-by-layer method, or by those techniques recommended by Farr. For the location of the incision, either the middle line or an incision over the rectum may be employed. In view of the tendency to wound hernia in elderly men, we favor the separation of the rectus muscle. Single infiltration is applicable to single cystotomies as in a first-stage prostatectomy, the removal of stone, etc., without complications. Where one finds it necessary to resort to more extensive dissections, with much retraction of the tissues, the field block will be found of great utility.

Field block.—This method is well adapted to the major bladder techniques such as resections, with deperitonealization as recommended by Voelcker, the diverticulum methods of Lower and others. The transperitoneal resection of Delbru, and the methods for the removal of tumors high up in the bladder as recommended by McCarthy, Scholl, and others are readily accomplished under field block. The lower third of the ureter is also readily treated, as suggested by Beer, for removal of calculi.

We feel that the deperitonealization methods recently suggested by Voelker represent the greatest achievement made in bladder surgery in many years. Our ability to carry out these techniques under local anesthesia presents very great possibilities to the progressive urologists.

Haslinger, Labat, and Swartzwold believe that any injections made in the line of incision reduce the vitality of the tissues when placed in contact with septic bladder contents. While we have not noticed instances of this kind, the experience of these eminent students is deserving of considerable weight. There are three kinds of field block commonly employed, their introduction being largely due to the labors of Hachenbruch, Illyes, and Labat. In the 100 bladder operations listed at the end of this article, all three types have been utilized. The more extensive operations are best performed under the wide blocks as recommended by Illyes and Labat. Field block is a typical example of conduction anesthesia. In other words, we build a wall of anesthetic fluid which surrounds the nerves in their course and quite thoroughly prevents the passage of impulses.

As can readily be seen, the abdominal wall is an ideal place to use this form of anesthesia. We find that much of the innervation occurs from the lateral aspects and is practically in parallel lines. In this connection let it be said that it is well in attempting any local or regional anesthesia to have clearly in one's mind the nerve distribution. This combined with a little patience will prove itself a most valuable adjunct in these procedures.

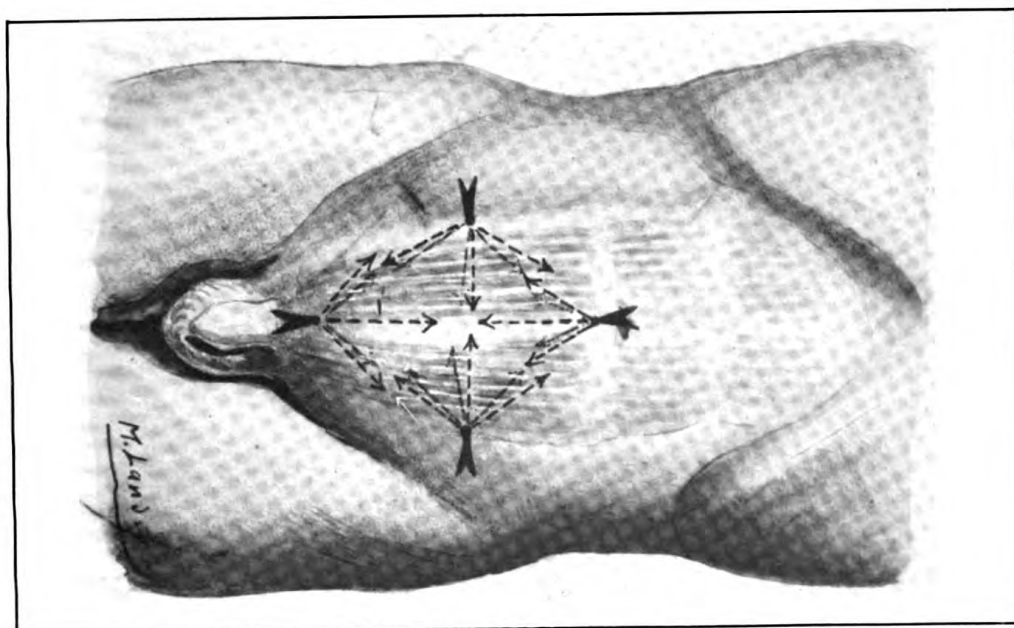


Fig. 1.—Suprapubic Field Block—Type 1

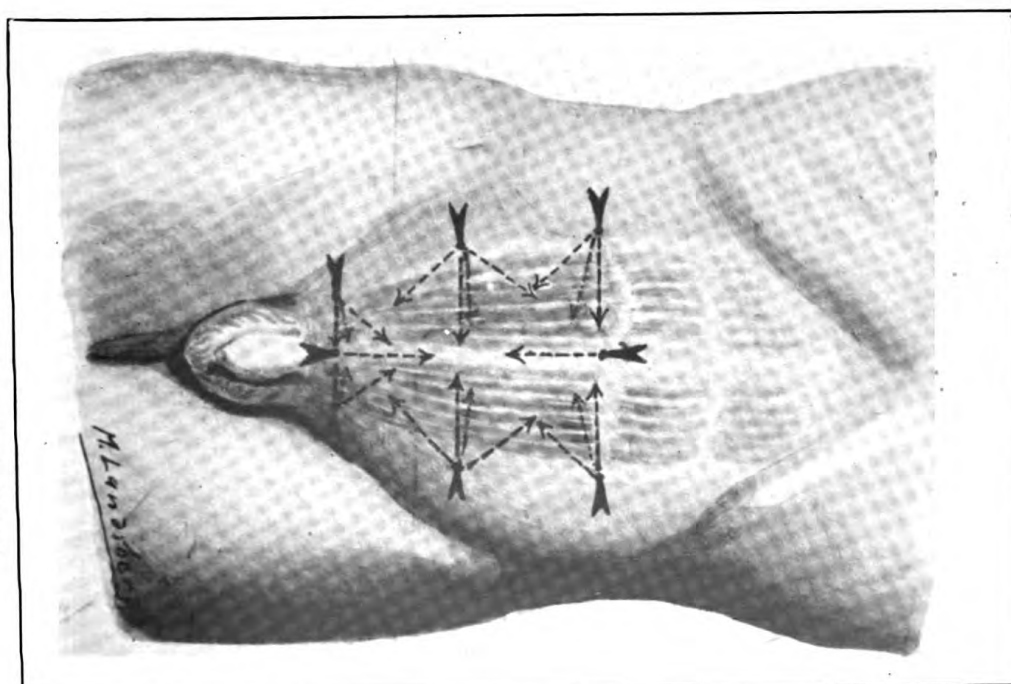
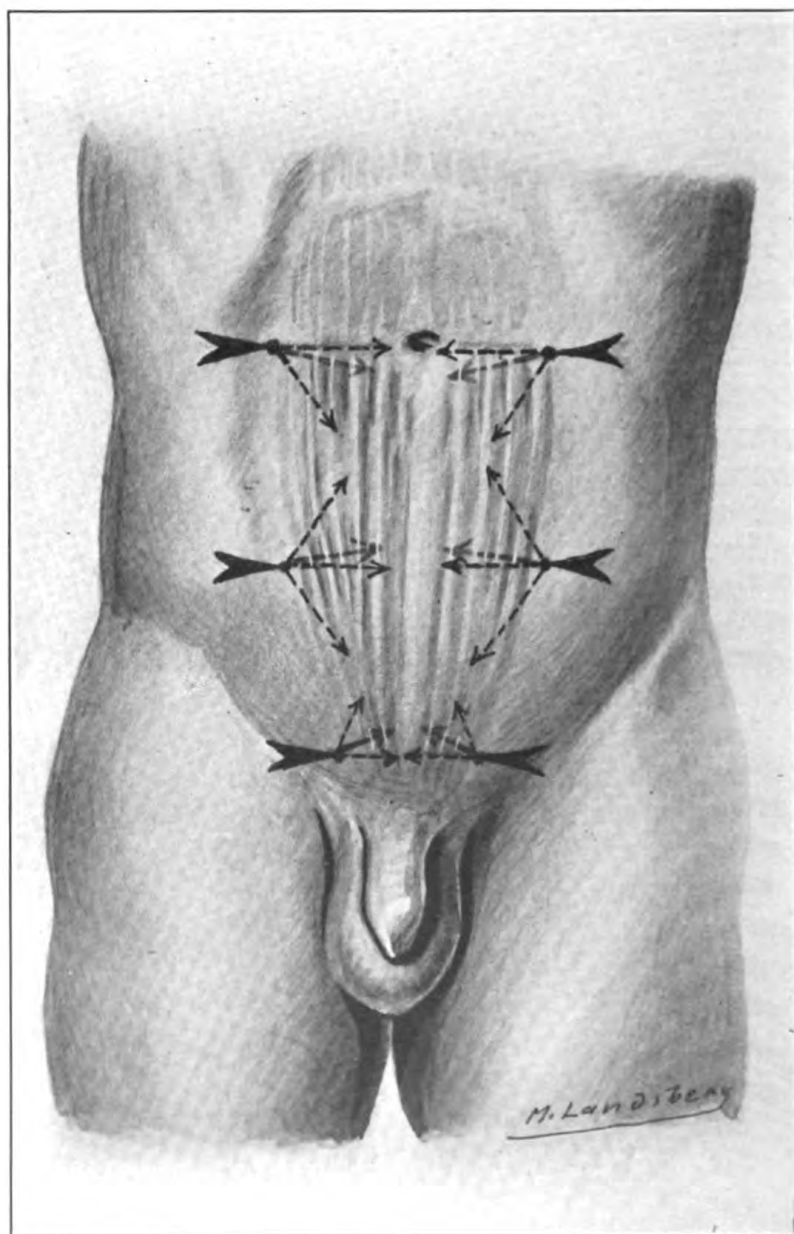


Fig. 2.—Suprapubic Field Block—Type 2

355-1



358—2

Fig. 3.—Suprapubic Field Block—Type 3

Type one (Fig. 1).—This method as now practiced is very similar to that originally proposed by Hackenbruch. Its adaptation to suprapubic bladder operations is simple and effectual. A superficial wheal is made in the midline of the abdomen an inch and a half or so below the navel. A second wheal is made in the midline about an inch above the symphysis pubis. A lateral wheal is made at the outer border of each rectus muscle and midway between the pubic and subnavel wheals. These punctures now form quite distinctly the points of a rhombus, and it is hence sometimes called the rhombus method. At each wheal a 10-centimeter needle is inserted and thrust directly downward, injecting as we go, until the aponeurosis is perforated. At the point of perforation a few cubic centimeters of the neocaine is injected and fanwise injections are then made toward the poles and the central area. Injections are then also made subcutaneously connecting all the points. Upon completion of the above, 10 cubic centimeters of fluid is injected through the lower wheal into the space of Retzius.

Type two (Fig. 2).—This represents the author's modification of the Illyes block. Briefly it is as follows: Eight wheals are made in the corium. The first, $1\frac{1}{2}$ inches below the umbilicus in the median line. A second, just above the pubic symphysis. Three wheals are then made at the outer border of each rectus muscle, one close to the pubic arch, one just below the umbilical level, and a third midway between the two. At each of these points we penetrate the aponeurosis and inject a few cubic centimeters of the anesthetic fluid. Fanwise injections are then made submuscularly and subcutaneously, connecting the points of puncture. Through the lateral wheals, injections are also made up and down the rectus border. Through the upper midline wheal, injections are made downward and laterally. Through the lower midline wheal, the space of Retzius is injected with about 10 cubic centimeters of 1 per cent neocaine.

Type three (Fig. 3).—The introduction of this particular type is largely due to the studies of Labat. It is both simple and effectual. It is of very great value in practically every operation on the urinary bladder by the suprapubic route. It has been our custom to carry out this procedure with slight modifications essentially as follows: Wheals are made just above each pubic spine at the outer rectus border. Another wheal is placed in the same line just below the navel area, while the third is made midway between the two. Subcutaneous and submuscular injections are made fanwise all along the lateral border of the rectus as described in the type two block. The space of Retzius is also injected in the same manner. We have utilized this technique in a large number of operations performed by various surgeons. Some of the cases were rather extensive resec-

tions, involving the vault of the bladder and it has proved most satisfactory. In all operative procedures on the bladder other than a single cystotomy, it is advisable to precede the field block with sacral anesthesia. This as a rule will, with proper care and technique, give us a painless operative field. One, however, at times sees a case in which there is a certain amount of bladder sensation in spite of the utmost care. This is particularly true where we are attacking the peritoneal surface, or its immediate vicinity. We have so frequently discussed the sacral techniques that we shall omit them here. The appended table shows the results of regional anesthesia in 100 bladder operations covering a period of a little over three years.

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Bladder operations under local anesthesia

Num- ber of cases	Average age	Diagnosis	Type of operation	Anesthesia	Postoperative reaction	Result of anesthesia
14	49	Stone in bladder	Lithopaxy	Sacral	None	Excellent.
9	53	do.	Suprapubic cystotomy	Suprapubic field block	do.	Do.
2	60	do.	Perineal cystotomy	Sacral anesthesia	do.	Do.
4	38	Stricture of urethra	Retrograde catheterization	Suprapubic field block and sacral	do.	Do.
4	42	Tumor, bladder dome	Deperitonealization resection	do.	do.	2 cases were sensitive on stripping.
3	54	Tumor, bladder post wall.	Transperitoneal resection	do.	do.	Complete anesthesia in 2 cases; third required inhalation.
8	40	Tumor of bladder base	Extraperitoneal removal	Suprapubic block and sacral	do.	6 complete anesthetics; 2 inhalations required.
3	33	Diverticulum	{1 transvesical } Resection	Suprapubic field block and sacral	do.	Excellent.
7	41	Ureterotomy	{2 extravesical } Lower ureter and beer type incision	Suprapubic field block	do.	Slight pain in exposing ureter in 4.
12	58	Bladder carcinoma	Suprapubic cystotomy with radium	do.	do.	Small amount of ether.
34	39	Varied bladder lesions	Cystoscopic manipulations	Sacral anesthesia	do.	Excellent.
						Incomplete anesthesia in 3.

SURGICAL TREATMENT OF SUPPURATIVE OTITIS MEDIA IN CHILDREN¹

G. B. TRIBLE, M. D., F. A. C. S. (former Commander, Medical Corps, United States Navy)

Due to the anatomical conditions and often the apparent innocuity of suppurative otitis media in children, the treatment has been frequently haphazard and inconstant, and surgical intervention delayed until the presence of intracranial complications is manifest. The inability of the patients to express their symptoms, the fact that they frequently, so far as intelligent expression is concerned, are inarticulate, all tends to neglect, both from the parents and the medical attendants. At this critical time is laid the foundation for future defective hearing, even with the cases escaping more immediate danger.

The first, and probably the most important, item of treatment is a free and proper paracentesis which, if performed early, even with no pus present, merely blood or serum, is a justifiable surgical procedure and can do no harm unless irrigation is instituted. At this juncture, smears and cultures of the escaped fluid should be made, for the course of the disease is determined in part by the infective agent.

Indication for paracentesis.—In typical cases, a bulging drum admits of no discussion, whether there be pus or serum. Blebs on the wall, extending over the membrane, or on the membrane must be distinguished from a bulging of the drum or any of its quadrants. Puncture of these blebs facilitates healing, but need only go through the superficial layers.

In influenza cases, and occasionally in coryza, when the child has been blowing his nose violently, there will be found an intense inflammation of the drum, vessels congested, but not an obliteration of the landmarks, which does not call for paracentesis, for, in a day or so, there will be resolution. However, should a clean paracentesis be done, there is no bad aftereffect, unless irrigation has carried in infection.

Interpretation of conditions of the membrane tympani is easily made early by the electrically lighted otoscope, and allows a more accurate diagnosis. The question of pain or even elevation of temperature is a relative one and can not contradict what is seen by direct inspection.

It often happens that parents and even general practitioners question the advisability of a paracentesis and bring up argument against this procedure. Kerrison gives the best presentation of the arguments in defense, to which should be added in the answer to parents, that opening the drum does not cause deafness. He states:

¹ Read before the Eye, Ear, Nose, and Throat Section, District of Columbia Medical Society, March, 1924.

"(1) Prompt incision of the drum membrane, may, and in majority of cases does, prevent serious mastoid involvement, which in time might lead to grave intracranial complication and death. (2) Experience has definitely shown that the average period of recovery is shorter following an early incision than in cases in which myringotomy is delayed. (3) The healing of the membrane, with restoration of normal intratympanic conditions, is hastened and, therefore, the average period of recovery is shorter following an early incision than in cases in which myringotomy is delayed. (4) Recognizing the varying virulence of different germs, delay in opening the drum membrane would seem to be the expression of a loose, haphazard method of thought which takes no account of the nature of the germ present, and, therefore, may favor the rapid, and possibly fatal, spread of the most virulent type of infection. (5) Finally, delay in incising an inflamed and bulging membrane is in opposition to the oldest of sound surgical laws, which demands that confined pus shall be evacuated."

In the case of children under 2 years of age, no anesthetic is needed. Wrapping them in a short blanket or cover, mummy fashion, so that they can not struggle, renders this operation one of less than 30 seconds duration and the aggregate discomfort suffered is less than that of the usual anesthesia. Certainly this procedure is less apt to be followed by a broncho-pneumonia. The otitis is nearly always associated with an upper respiratory infection, and even nitrous oxide, the safest of anesthetics, may permit an insufflation pneumonia. The use of the ether rausch, or ethyl chloride, can be substituted for nitrous oxide when indicated, and while probably not quite so safe can not be termed dangerous. Younger children are not good risks for gas anesthesia, and can not be controlled by local better than without any anesthesia. The excitement and commotion of placing pledgets against the drum is just as distressing as the proper paracentesis.

Twenty-four hours after paracentesis irrigation should be started, weak boric-acid solution or soda bicarbonate, to remove secretions, then the instillation of mercurochrome, 1 per cent, with curved tip dropper. Prolonged slight suppuration is frequently kept up by reinfection from the nasopharynx, and properly performed tonsillectomy and adenoidectomy will go a great way toward clearing up the discharge.

Middle-ear suppurations, sequel or complication of one of the exanthemata, are frequently more vicious than those caused by extension from a simple upper respiratory infection. They are accompanied by a more extensive mastoid involvement and are more prone to end in a chronic suppurative otitis media, which does not yield to

any local treatment, and causes a marked deterioration in the acuity of hearing.

Retropharyngeal abscess may occur preceding or during an attack because of involvement of the lymph nodes in the vicinity of the Eustachian tube. These abscesses are occasionally confused with a peritonsillar abscess and of course demand immediate attention.

The next point is the correct time to intervene in a suppurative otitis media, other than by attention to the drum and middle ear; in other words, to determine if the acute inflammatory mastoiditis, which comes histologically in nearly all acute middle-ear abscesses, is a surgical mastoiditis. This is more complicated in children than in adults, for the X ray is of little value until after three years of age, and the blood findings are decidedly different from those found in adults.

The question of repeating or widening the drum incision can be answered by the appearance of the drum. If bulging from any segment is present, a freer incision is indicated; certain operators have even made trephine openings, removing a section of the membrane, so that early union is prevented.

In the natural course of events, discharge will cease and healing take place, but immediate restoration of the membrane in its normal relations and with the normal characteristics is not to be expected. Forcible syringing, as frequently practiced by parents and nurses, to clean the ear and wash out obstruction is never necessary. It may, by breaking away the new epithelial cells, reestablish the opening and cause further suppuration. When discharge lessens, irrigations should be discontinued, and treatment instituted by wiping away secretion, cleansing the canal, and instilling a mild antiseptic; or the dry treatment with an antiseptic powder may be employed. The practice of cramming cotton tightly into the canal is to be condemned, a loose gauze wick inserted as deeply as possible, close to the opening in the drum, being preferable.

When a series of conditions in sequence or several conditions are found coexisting, the relative importance to be assigned each, in the general clinical picture, can only be determined by the experience of the surgeon and the full cooperation of the pediatrician.

Frequently the subconscious impressions stored up from other cases, perhaps more often from those in which our judgment was faulty, help us to an accurate diagnosis.

Complicating the picture most frequently the past few winters has been influenza; then follow measles, scarlet fever, pneumonia, whooping cough, diphtheria, chicken pox, and, as the immediate forerunner, irrespective of cause, any inflammation of the nose and nasopharynx. In girl babies, the irregular fever, with chills and

high leucocytosis of pyelitis, is a perplexing problem and obscures the clinical picture. With a clearing up of the ear suppuration by treatment locally or by mastoid operation, this clears also. It is probably kept up by the elimination of bacteria and their toxins. Any throat and nose infection in children is prone to involve the middle ear, for the Eustachian tube is shorter and more patent in children than in adults. Nasal drops and irrigations are correspondingly more apt to produce infection.

Indications for opening the mastoid and draining the antrum are somewhat different in children than in adults. The anatomy of the child's tympanic cavity differs, especially in the superior wall. The osseous plate forming this wall covers the antrum, forming its roof; its continuance is the roof of the canal for the *tensor tympani* and the osseous portion of the tube and has, in the infant, processes of connective tissue containing vessels passing from the dura into the tympanic cavity. Both in adults and children the posterior superior wall normally contains the opening into the antrum. In children this may not be patent, and an antrum infection may take place by bacterial invasion from the middle ear in course of an infection, or systematically, independent of a middle-ear suppuration. The middle ear may clear up in the first instance, and the antrum suppuration continue, with an intracranial complication.

This probably accounts, in some part, for the cryptic mastoid infections reported. There will be an infection in the usual manner, extension to the antrum and, by contiguity, the neighboring cells are infected and in turn the entire process. This gradual extension from the antrum can be traced in the radiographs; first a few cells around the antrum show cloudiness, then all become hazy, with a later breaking down of the intracellular septa, and cases can be imagined with a broken-down mastoid and at the same time a clear middle ear.

In young children it would really simplify matters to speak of external drainage of the mastoid antrum rather than of mastoid operations, for there may be no pneumatization, no mastoid cells, and only an antrum to drain. The symptoms in young children indicating the advisability of postauricular or open drainage of the antrum, may be divided into general and local. If there is not sufficient improvement in the general condition, fever keeps up or is intermittent, with free tympanic drainage, and other factors are negligible, external opening is needed. Invasion of the blood stream or meningeal involvement is to be feared if there is delay, and may be present even then. Labrynthitis in children is either relatively rare or perhaps overlooked. The blood picture is of great value when positive findings are made, of no value when negative. The normal difference in the differential blood count of

children as compared to the adult must be borne in mind. A further factor, the degree of leucocytosis, depends somewhat upon the invading organism and the patient's resistance. The hemolytic streptococci frequently do not produce an increase of leucocytes, and yet are among the most virulent, if not the most virulent, infective agents. Pulse, temperature, and respiration in typical cases are helpful, in others, not. The question so far must resolve itself into the exclusion of systemic disease or estimation of its rôle, and the impression given by the patient. Is he sick or not? In children, as in adults, local symptoms may be of great help, but the classic signs of inflammation are conspicuous by their absence. Pneumatization has not progressed in young children sufficiently for a large mastoid process to be found before three years of age, and the two sides may differ. Local tenderness, so valuable in the adult, is not found. One symptom, unusual in the adult, is frequently noted, and that is subperiosteal abscess, due to presence of an unclosed fissure along the line of junction of the petrous with the mastoid portion proper.

Profuse discharge, continuous or intermittent, which does not tend to diminish after the usual treatment for a period of three or four weeks, and which shows marked pulsation, is an indication for operation. An erosion of the mucosa and an osteitis of the ossicles or of the bony walls will certainly occur if no other injury, and there will be left a chronic suppurative otitis media with its accompanying deafness. Sagging of the upper posterior canal wall, when not a part of an external otitis, is one of the signs pointing to a deeper involvement. This indicates a marked antrum infection with an osteitis or osteoperiostitis over that area, and demands exposure and free drainage, with removal of broken-down bone.

Marked glandular enlargement of either the anterior or posterior chains of lymphatics must be considered an evidence of an extensive infection and bacterial invasion of tissues beyond the mastoid, and if the infection is not removed there will be a breaking down of the glands and consequent scarring and deformity. The glandular enlargement from infected tonsils alone does not often extend so far back as the mastoid tip, at least at first, while the adenitis of mastoid origin is frequently accompanied by a little cellulitis so the glands are difficult to outline. The posterior gland chain is infected through the communication from the anterior group, under the sterno-cleido-mastoid. The spontaneous breaking down of the tip, or discharge through a fissure, with the burrowing of the pus gives rise to a type of abscess known as Bezold's, not seen so much in these days of more prompt intervention.

Paresis of the external rectus on the affected side is a striking symptom, and one which can not be overlooked. Its explanation lies in the anatomical relations of the sixth cranial nerve, which

comes in contact with the infection from cells in the petrous portion of the bone. While these cells can not be reached surgically, clearing out the accessible portions of the infection enables the protective influence provided by nature to take care of this factor. Facial nerve paresis is a symptom of graver import, though it usually clears up. Fissures leading to the canal are sometimes found in children, and the stylo-mastoid foramen itself is directed nearly straight outward.

The occasion for operation may be determined to some extent by asking in these cases, What are the contraindications for free, posterior, direct antrum and mastoid drainage? There can be no operative danger commensurate with the good done. The preservation of the hearing alone is a most important factor. During a number of years duty, when many candidates for the Naval Academy came for reexamination, or those already midshipmen who had fallen below the minimum hearing requirements were held up for examination and treatment, it was more and more apparent that the rejected candidate had either the history of prolonged childhood suppuration, or showed physical evidence of it. One reason that mastoid cases in the past have failed to recover normal hearing following operation has been the delay in the performance of the operation, due to an unwarranted fear, and this delay in turn has permitted such pathological changes to take place that proper function was impossible. Seeing only the effect and not being capable of assigning due weight to the cause, the lay mind has gotten the idea that a mastoidectomy means poor hearing.

The operative procedure is simple, and can be done in a few minutes. As before mentioned, in young children, where there has been no pneumatization, there is only an antrum with some softened bone around it. Like everything else, this is subject to many exceptions, and occasionally a miniature adult mastoid is encountered. A small retroauricular incision is made, not extending so low as the limit of the auricular attachment, for fear of injuring the facial nerve at its exit from the stylomastoid foramen, bearing in mind its infantile relationship. Keep the incision about one-eighth to one-fourth inch back of the attachment. The area just at the edge of the bony canal and over the antrum will be exposed. The antrum can be in only one place, slightly above and posterior to the middle ear, and that, in turn, is at the end of the external auditory canal, which in children, is shorter and less tortuous than in the adult, so the canal is the only landmark either constant or needed. The incision is best lengthened by scissors so that the nerve at the foramen will be less apt to suffer injury. Undue extension upward into the fibers of the temporal muscle is unnecessary and, when done, causes bleeding which will obscure the field. Pushing the membranous canal forward exposes

the margin of the bony canal in its posterior superior segment. Just back of this, chisel directly into the antrum, preferably using a small gouge, then clear away the softened bone, exposing the entire antrum, and insert a small perforated soft rubber catheter into the antrum, leading it downward to the lower limit of the wound. Pour a little 5 per cent dichloramin-T in oil or other suitable antiseptic into the wound area and insert a small gauze wick in the canal and apply the usual, but smaller, mastoid dressing. Removal of adenoids and tonsils if present, does not unduly delay the operation and, if there are no contraindications, should be performed.

The outside dressing had best be changed the next day, but leave the tube for 24 to 48 hours longer, unless there is very much suppuration when it should be removed and the wound irrigated with 0.6 per cent Dakin solution. As a rule, the middle-ear discharge ceases within 48 hours and all discharge by the end of the week. No damage has been done by the operation *per se* and the clearing up of the middle-ear infection has prevented the possibilities of intracranial or sinus extension and has avoided pathological changes affecting the middle-ear contents, with later impairment of function.

CENTERS OF ENDEMIC AND PREVALENT DISEASE IN CHINA

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The investigation here reported is part of a study of diseases prevalent in China, undertaken for the purpose of ascertaining the possibility of transmission of these diseases to the United States.¹

It is an axiom of epidemiology that diseases follow trade routes, the rapidity of the extension being governed by the character of the country traversed and the methods of transportation. Localities separated from neighboring regions by deserts, by water, or by mountains develop local diseases, local immunities, and local susceptibilities due to the lack of easy communication and to the fact that in general only strong, healthy individuals are able to pass these natural barriers.

To the epidemiologist China presents unrivaled opportunities for the observation and study of what may be termed the evolution of disease transmission. There we see a great and populous country which for centuries has been the seat of a civilization far superior to that of the surrounding nations; a country self-sufficient and self-supporting; a people completely free from the spirit of conquest and capable of absorbing and assimilating its invaders; a land isolated

¹ Under the authority of the Washington State Board of Health.

by deserts on the north, by impassible mountains on the west and southwest, and by the greatest of oceans on the south and east.

Until recent years the Chinese have lived by themselves and for themselves, a nation of peace-loving agriculturists and philosophers, with an occasional pirate and soldier by way of variety, so far advanced in culture and arts as to be without incentive to travel in the, to them, barbarous outer world, living in a land so fertile as to make them independent of imports, and geographically so effectively isolated as to be accessible to only the hardiest of invaders, as, for example, the Tartars, who although physically able to overcome the Chinese defenders have in turn been conquered and assimilated by the superior Chinese mentality. Thus China, isolated both by nature and national policy, has developed her culture, her industries, her arts, and even her diseases, unmolested to any great extent by such disturbing factors as the conquests and invasions, migrations, and commercial relations which have so greatly complicated the evolution of all European institutions.

Within her own boundaries also conditions have been such as to develop many distinct sections rather than a homogeneous people; methods of travel have been slow, trade routes in most instances short, but, when long, following very definite lines; dialects have developed and diverged; the ties of family and clan are very strong; local magistrates have imposed tolls, port charges, and transit duties; and in many instances Provinces have coined their own money, which is taken only at a discount by other Provinces. It is easy to see under these conditions how communication would be greatly restricted; and although many Chinese are great travelers, the vast majority of the people never pass the boundaries of their own sections.

As would be expected under such conditions, the transmissible diseases which we find generally over the entire country are those which do not incapacitate during the contagious period, for the difficulties of travel are such that an individual who is at all ill will not attempt them. These diseases are tuberculosis, syphilis, smallpox, infection by the metazoal parasites, and, with the exception of the northwestern section, leprosy.

In a study of the sectional distribution of diseases the country falls naturally into three well-marked geographical divisions. The basin of the great Yang Tse River, China's most important artery of trade and commerce, extending from the western to the eastern boundaries of the country, forms the central of these; North China lies to the north and South China to the south of it, and each of these three divisions may be subdivided into an eastern and western section.

The diseases found in North China are in general of a milder type than in the central and southern divisions; the climate is dryer, the summers hot, and the winters long and rigorous.

In the eastern section of North China we find typhus fever, relapsing fever, and, among animals, rinderpest. In Korea, paragonimiasis, or epidemic hæmoptysis, also called Japanese lung-fluke disease, is always to be found. Dysentery of the bacillary type occurs in Shantung Province, and there is also a center in this Province for a peculiar form of gangrene much resembling ergot poisoning. The city of Newchwang and its immediate surroundings have become permanently infected with plague, evidently from the rats of coastwise commerce.

The western section has, in addition to typhus fever and rinderpest, anthrax. A district has been reported near the southern border of Mongolia where plague is said to be endemic, and the same disease is undoubtedly present as an epizootic among some of the small fur-bearing animals of Manchuria, the seat of the great epidemic of pneumonic plague.

The climate of South China is hot and moist, a typical subtropical climate, and the diseases which are found throughout the country occur there in an aggravated form. In this connection an investigation by Heiser of the mortality and morbidity among the inmates of Bilibid Prison, in Manila, is of interest. He proved that intestinal parasites reduce general resistance to such a degree as to cause a distinct increase of mortality from other diseases among persons so afflicted. This may well account for the rapid and advanced types of tuberculosis, syphilis, and leprosy which seem to occur more frequently in South China than in the other divisions, for the metazoal parasites find such a climate particularly salubrious and they flourish there in great abundance and vigor.

The diseases to be noted in this division are plague, cholera, dysentery (largely of the amebic type), malaria, dengue, goiter, and vesical calculus. Of these, goiter is found mainly in the mountainous region along the southern boundary, and vesical calculus is especially frequent in and about Canton.

The western section of this division, like the western sections of Central and North China, being at a distance from the coast, has few medical men, and hence reports of diseases are meager and difficult of confirmation.

Central China is the seat of the most extensive foreign commercial interests of the country, the Yang Tse River being navigable by ocean vessels for a distance of 900 miles, and the opportunities for accurate observations have been numerous.

The diseases to be met with throughout the eastern section of this division are cholera, typhus fever, relapsing fever, the dysenteries, malaria, filariasis, beri beri, measles, and trachoma. Anthrax has been reported in the south central region of this section and to the northwest of Hankow; sprue is endemic along the river from Chinkiang to Shanghai; goiter, in a district northwest of Hankow and on the island of Tsungming in the estuary of the Yang Tse; kala-azar occurs through the northern and western parts of the section; scarlet fever, which has been introduced by the foreigners, has become endemic in Shanghai; and there is a very distinct center for vesical calculus in the northern part of the province of Anhwei.

The western section of Central China, which is rugged and mountainous is the most healthful district of the entire country, and the only diseases reported, in addition to those common to the country as a whole, are goiter and malaria.

It is not the intention to convey the impression that the diseases mentioned are continuously prevailing throughout the various sections. Most of them have a more or less seasonal prevalence and may even be so light during certain years as to be practically absent. They are, however, the diseases which one living in these sections would most frequently meet and are the ones to be considered in forming a general disease picture of the country.

CLINICAL NOTES

USE OF CHLORINE GAS AT THE NAVAL TRAINING STATION, HAMPTON ROADS, VA.

By W. C. ESPACH, Lieutenant Commander, Medical Corps, United States Navy, and
O. WILDMAN, Lieutenant, Medical Corps, United States Navy

In September, 1924, an article on chlorine-gas treatment for respiratory affections by Colonel Vedder of the Army Medical Corps came to our attention. We felt that the training station, with its great number of young recruits, offered an ideal field for a treatment of this type. By far the greatest number of sick days are due to respiratory affections, and if there was any merit in the idea, it ought to prove worth while in a place of this kind. One of us went to Edgewood Arsenal to see Colonel Vedder and to inspect the plant in operation there. By October 15 we had our plant assembled, and were able to start treatment.

A short description of the plant here may prove interesting: Two rooms in the old operating pavilion were taken, one capable of holding 16 people was used as the treatment chamber; the other used for the apparatus. In the latter room we have the chlorine tank, the water tanks used for measuring the air to be tested, the water bottle used to control gas pressure, and the testing table. The gas leaves the pressure tank, passes thence through the water bottle, from there through the flow meter and into the intake pipe leading to the treatment chamber. This pipe has several right-angle elbows in it to aid in mixing the air and the gas; which mixture comes into the treatment room along the ceiling near one wall. Along the floor on the opposite wall is the outlet pipe in which a belt-driven, 18-inch exhaust fan, run by a 1½-horsepower motor furnishes the motive power for the change of air in the room.

Frequent accurate determinations of the chlorine content of the air in the treatment chamber are imperative, as the therapeutic range of chlorine concentration is narrow. A chlorine content below 0.009 mg. per liter of air is probably too weak for beneficial results, and 0.02 mg. per liter will cause irritation in most persons. We have found concentrations between 0.012 and 0.015 mg. chlorine per liter of air to be satisfactory.

The apparatus for the determination of the chlorine concentration in the air chamber consists of two wide-mouth bottles of 250 c. c. capacity, each fitted with a two-hole rubber stopper. Each bottle is

fitted with two elbow glass tubes. One tube reaches to the bottom of the bottle, the other just passes through the cork. The long-arm elbow tube of one bottle is connected by rubber tubing to a pipe which leads to the exhaust duct of the gas chamber. The short-arm tube of this bottle connects by rubber tubing to the long-arm tube of the second bottle and the short-arm tube of the second bottle is in turn connected by tubing to the top of an aspirating tank which is gauged to hold 50 liters of water. In order to obtain an aspirating tank that would hold 50 liters, we obtained two water tanks, each having about 40 liters capacity, from a hospital sterilizing outfit and connected one tank above the other. These tanks have glass gauges, inlet and outlet water connections, and serve the purpose admirably. The tanks are filled with water to the point on the gauge, that by accurate measurement has been found to show just 50 liters of water. Each bottle is filled about half full with 2 per cent potassium iodide solution, the stoppers tightly replaced, and the outlet valve of the aspirating tank opened and 50 liters of water withdrawn. The vacuum created by the withdrawal of 50 liters of water is replaced by 50 liters of gas from the gas chamber. This air bubbles through the potassium iodide and free iodine is liberated in accordance with the following equation: $\text{KI} + \text{Cl} = \text{KCl} + \text{I}$.

The first bottle, that is the one connected directly with the gas chamber, is disconnected and a few cubic centimeters of 0.5 per cent starch paste added. A deep blue color appears and N/100 sodium thiosulphate is carefully added from a burette until the blue color is just discharged. The reaction is as follows: $2\text{I} + 2\text{Na}_2\text{S}_2\text{O}_3 + 5\text{H}_2\text{O} = 2\text{NaI} + \text{Na}_2\text{S}_4\text{O}_6 + 10\text{H}_2\text{O}$.

From the first equation it is seen that one atom of chlorine liberates one atom of iodine and in the second equation one molecule of sodium thiosulphate unites with one atom of iodine; therefore it is evident that one molecule of thiosulphate is equivalent to one atom of chlorine. The atomic weight of chlorine is 35.5, and since the full molecular weight of sodium thiosulphate is used in making a normal solution a liter of normal thiosulphate solution would represent 35.5 gm. of chlorine. One cubic centimeter of normal thiosulphate solution equals 0.0355 gms. of chlorine; therefore each cubic centimeter of N/100 thiosulphate used would represent 0.000355 gm. or 0.355 mgm. of chlorine. Let us suppose that 2 c. c. were required to decolorize the solution in the bottle, then 2 times 0.355 mgm. equals 0.710 mgm. of chlorine in 50 liters of air, or 0.0142 mgm. of chlorine in one liter of air in the chlorine chamber.

The N/100 sodium thiosulphate volumetric solution is made up by careful titration against N/100 iodine solution or by using the

potassium dichromate method given in the United States Pharmacopœia.

Thus, it can be seen, that to get satisfactory results one must be able to know exactly what concentration of gas the patients are being exposed to. In order to determine and control the concentration of gas in the treatment chamber, it has been our policy to make a test at 15-minute intervals. Due to the fact that chlorine is absorbed so rapidly by the clothes of the patient and the walls of the room, a constant and uniform flow of gas must be maintained through the room. With the old type of bubble apparatus it is absolutely impossible to know what the concentration is five minutes after the gas is liberated.

The following table gives some idea of the work done here in the past nine and a half months:

Diagnosis	Number treated	Improved	Cured	Not improved	No report
Nasopharyngitis (common colds)	265	143	41	2	79
Bronchitis, acute	96	57	17	12	10
Bronchitis, chronic	24	14	2	1	7
Laryngitis	12	8	2	2	-----
Whooping cough	22	19	3	-----	-----
Sinusitis, ethmoidal	8	1	6	1	-----

In a work of this type it is hard to gather reliable data; many of the patients who are checked as of the improved class felt so much better that they did not care to take the time for further treatments. If they had, we believe that the cured rate would have been considerably higher. The same holds true with many of those who did not report back. Many of these latter were other than service patients and did not consider it necessary to report their condition. Therefore, these figures are only approximate. Those who were not improved or who were made worse by the treatment never failed to let us know.

While we have had only 22 cases of whooping cough, our experience has been most satisfactory. All cases have shown great improvement after four or five treatments, and the three who continued through six and seven treatments were completely cured. This means that in 7 to 10 days, one can cure a case of this disease, and that, alone, seems well worth while.

Eight cases of sinusitis, ethmoidal, were treated. First, free drainage was established by surgical interference. Subsequently, each day after application of cocaine adrenalin solution to the nasal mucosa, silvol (10 per cent solution) was instilled into the nares and the patient sent to the gas chamber for treatment. Six cases were regarded as clinically cured, one as appreciably improved, and one

unimproved. The number of treatments per case varied from 8 to 17 before cure was effected or treatment suspended. Four of these cases were under observation for a period of six months or more, during the winter season and, in spite of contracting "colds," there was no recurrence of the sinus infection. The results were most satisfactory to the nose and throat specialist at this station.

During the winter months we usually have a great many cases of measles and mumps. This brings up the question of quarantine of contacts, and of course, that meets with wails from those in charge of training. As an experiment, we decided to run all contacts through the gas chamber. On the first day we kept them in a half hour and on the second day one hour. During the months of February, March, and April, 533 measles contacts and 276 mumps contacts were sent through. One of these men contracted measles; other than this no cases developed.

We feel that the results obtained by us with this treatment have more than justified another year's trial. There is no desire on our part to make any extravagant claims for this treatment, but it seemed as if our experience with it might prove interesting to the service at large, and especially to the medical personnel handling training stations.

PILONIDAL SINUS¹

By W. A. STRAUSS, Lieutenant (Junior Grade), Medical Corps, United States Navy

Pilonidal sinus is a congenital defect, and, as its name signifies, is a sinus usually containing hair. So far as is known, it was first described by J. M. Warren in 1867, and later by Hodges in 1880, who gave the lesion the name it now bears, which is synonymous with coccygeal fistula. The aperture may be situated anywhere in the perineum but is usually found in the midline in the region of the coccyx.

It is found in both sexes, but is overwhelmingly more common in the male and is most frequent between the ages of 15 and 30. Of 61 cases seen in the Johns Hopkins Hospital, all were white, and only 10 were females. The sinus is thought by some to be due to persistence of the medullary canal in the embryo, while others contend that this is not so, among them McFarland and Stone, who believe that it must be regarded as a special down-growth of epithelium, originating from the true skin. It usually gives no symptoms until adult life, when a fall or blow may act as the exciting factor. Soreness develops over the coccyx and, soon after, a discharging sinus attracts the patient's attention. The medical attendant may recognize the

¹ From the U. S. Naval Hospital, Washington, D. C.

true nature of the affection, but he frequently mistakes it for a simple fistula in ano, or, if it is infected, may think it is an ischiorectal abscess. Treatment consisting of incision and drainage gives only temporary relief, and the patient goes from one physician to another until the condition is correctly diagnosed and properly treated.

The sinus is from 2 to 4 centimeters or more in depth, is of variable diameter, and generally contains hair, which grows from the epidermal cells lining the sinus. There may be sebaceous matter present, and, if infected, which is frequently the case, a considerable amount of pus may be found.

Diagnosis should not be difficult in typical cases where the sinus is situated in the midline near the coccyx and does not communicate with the rectum, and particularly when a tuft of hair is seen or has been seen in the sinus. However, many of the cases present numerous orifices, variously situated in the perineum, with intercommunicating sinus tracts and, in infected cases, large inflamed fluctuant areas. One may readily consider them to be fistulæ or ischiorectal abscesses. Many have been mutilated by previous operations, and in many there is a history of a sinus persisting in spite of all treatment, so that bony involvement may be readily suspected. On the subject of mistaken diagnoses, Doctor Bevan of the Presbyterian Hospital states that there have been 40 to 50 cases operated upon on his service in which the true pathology was not recognized. In one of his reports in the Surgical Clinics of Chicago he states, "Only last week we had a boy come in from the naval station who had been operated on twice during his service in the United States Navy during the last few months. The case was quite typical and so we recognized it at a glance. It was in the usual position in the middle over the coccyx and sacrum. He had three to four fistulous tracts, and out of one of these projected a bristle of hair, which made the diagnosis quite definite. In spite of that fact, this had been operated upon twice, curetted, and packed with gauze without curing the patient. The patient was very much distressed and believed that he had some incurable disease of the bones of the coccyx and sacrum, and came to us with this diagnosis. A radical debridement was easily accomplished and the patient is going on to a permanent cure."

Just a few days ago a similar case came to this hospital who had been operated on twice in Pittsburgh by the same surgeon without success.

Treatment consists in the complete removal by dissection of the sinus and cyst. Under regional anesthesia the operator is able to proceed carefully and slowly so that the entire pathologic area may be removed en bloc. Only in this way can a permanent cure be obtained.

Following are three cases which were treated at the United States Naval Hospital, Washington, D. C., in the past six months:

The first was a white male, age 25, of cleanly habits, well developed and nourished. He entered the hospital complaining of a fistula and gave the following history: Two months before entry to the hospital he noticed that a small nodule which had been present in the perineum for a number of months had begun to increase in size. One month later the area was incised, diagnosed as a blind external fistula, and treated as an open wound. Healing was prompt, but a sinus reappeared after a very short time, which was again operated upon with the same unsuccessful result. On examination there was found an outwardly curved fistulous tract running from a depressed opening on the left side of the perineum near the scrotum, to the outer portion of the anal margin. A seropurulent discharge was issuing from the fistulous opening. Proctoscopic examination revealed nothing further. Operation was performed under regional anesthesia (sacral block) and the fistulous tract was being carefully dissected out when a cyst was encountered which contained several tufts of hair. The original incision was enlarged and the entire cyst removed. The cyst extended from the left side of the perineum to a point posterior to the sacro-coccygeal articulation. From the perineal opening of the cyst a subcutaneous sinus extended in an outwardly curved arc to the external sphincter. The wound was closed with plain catgut, a sufficiently large opening being left for drainage because of the infection. Ten days later the wound had completely healed.

Case number two was a white male, age 26, of cleanly habits, who entered the hospital with an infected finger. While at the hospital a discharging sinus was seen in the midline between the anus and the tip of the coccyx and was diagnosed as pilonidal sinus. Operation was performed, employing sacral block, and a lobular cyst was dissected out. The cyst was 2 inches long, had its origin at the base of the coccyx, and terminated in a sinus in the skin over the left gluteus maximus muscle. The wound healed in seven days and the patient was still well and free from symptoms two months later.

The third case was a white male, age 23, of cleanly habits, who entered the hospital complaining of pain about the rectum, of only two or three days duration. On the inner folds of the right nates there was a large inflammatory area with definite fluctuation. Between the anal orifice and the tip of the coccyx there was a small sinus; no discharge was seen. A diagnosis of abscess of right buttock and pilonidal cyst was made. The abscess was incised, evacuated, and drained with healing after three weeks. A second operation was then performed under regional anesthesia and the sinus tracts and cysts dissected away. Healing was complete after four weeks, with no recurrence four months later.

In the Surgical Clinics of Chicago in June, 1919, Doctor Bevan reports several cases of which I shall quote one:

He is a man of 20 to 25 years. He has had excellent health until about two years ago when he developed an abscess on the left side of the anus, which was opened, leaving a fistula. This has been operated upon several times, but has never been cured. A number of fistulae have gradually developed in this region and we find five fistulous tracts which are apparently openings into an ischiorectal abscess on the left side and seem, at first glance, as though they are typical anal fistulae opening also into the bowel.

The several physicians who have operated upon this case have done so with the understanding that they had an ischiorectal abscess and anal fistulæ to deal with. They have split open these fistulous tracts down into the rectum, packed the wound with gauze, and attempted to obtain complete wound healing, but have not been successful in doing so. My examination has so far failed to show any definite connection between these fistulæ and the rectum, and I have some doubts as to the pathology of the condition with which we have to deal. * * * As I open these fistulous tracts, you will notice that I open into a fairly good sized pocket containing pus and granulation tissue, and you will notice also that I pick out a mass of hair. * * * I believe that we probably have to deal with a pilonidal cyst in an unusual position. Continuing the dissection, you will notice that I have now laid open the entire tract and I find that the abscess and the fistulæ do not lead into the rectum. I am carefully dissecting out the entire lesion and doing what one might call a debridement.

In considering the foregoing cases, it is evident that pilonidal sinus is not particularly uncommon and should always be suspected whenever a sinus or fistula presents itself in the region of the coccyx and particularly so when the lesion persistently recurs after treatment.

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POLIOENCEPHALITIS OR ACUTE INFERIOR ENCEPHALITIS¹

REPORT OF A CASE FOLLOWING TRAUMA

By C. D. MIDDLESTADT, Lieutenant (Junior Grade), Medical Corps, United States Navy

The comparative infrequency of acute hemorrhagic encephalitis following trauma, the clinical picture presented, and the unusually rapid course of the case here recorded, with fatal termination, are points of sufficient interest to justify a rather lengthy and detailed report.

REPORT OF CASE

A. B. L., white, male, age 23, was admitted to this hospital with "diagnosis undetermined" on September 10, 1924. His chief complaint was pain in the back and right arm following a fall.

Family history.—Negative.

Past history.—He had the usual childhood diseases and Bright's disease. Gonorrhea in 1923. Adenoidectomy and tonsillectomy in 1915.

Present illness.—While painting on the fantail of his ship he lost his balance and fell to the dry dock, a distance of about 25 feet, lighting on his back. He was not unconscious at any time.

Physical examination.—Patient, upon admission, was in somewhat excitable state. Pupils were equal and responded to light and in accommodation. Heart

¹ From U. S. Naval Hospital, New York.

sounds were distant. No murmurs nor thrills were present. **Extremities:** The right arm was painful in the region of the insertion of the deltoid muscle and there was some pain about the elbow upon flexion. There were no abnormal movements nor crepitus at either point, but a slight amount of swelling. **Spine:** Some tenderness over the region of the sixth thoracic vertebra; no deformities nor swelling were present. Roentgenological examination of the thoracic vertebræ, fourth to eighth inclusive, and right shoulder girdle was negative. Diagnosis was changed from "undetermined" to "contusion of the spine, fourth and eighth vertebræ." Patient made an uneventful recovery except for some pain upon movement of right arm. He was returned to duty on September 24, 1924.

On October 3, 1924, nine days after he had been discharged to duty, he was readmitted to this hospital with "diagnosis undetermined, probably psychoneurosis traumatic." His history at this time was that, since he had left the hospital on September 24th, he had had pain in his right chest anteriorly, which radiated posteriorly, shortness of breath, and inability to swallow any food except liquids. If he attempted to swallow solid foods he would immediately vomit. Further questioning of the patient at this time was impossible because the distress of the patient on conversing caused considerable shortness of breath. Consultation by three medical officers was held while the patient was in an attack of dyspnea. Their conclusions were that he was suffering from asthma. After the attack, however, he still exhibited shortness of breath, but it was not spasmodic in type. He was unable at this time to articulate distinctly. His throat and vocal cords were examined and found to be negative. **Chest:** A few sonorous râles were found on both sides during inspiration, which was somewhat prolonged. Heart sounds were clear. Heart somewhat enlarged to right and downward. Some cyanosis at this time. His finger nails were blue and he appeared to be gasping for breath. On account of these findings, his diagnosis was changed from "undetermined" to "dilatation, cardiac, acute." Early in the evening the patient became more cyanotic and continued to gasp for breath. Death occurred at 1.30 a. m., October 4, 1924, about 12 hours after his admittance to the hospital.

Three medical officers ordered to review the case and to determine the cause of death reported that, from a review of the health record, history, and clinical findings, the diagnosis of "dilatation, cardiac, acute" was substantiated. Autopsy showed that the following condition was present:

Acute edema of the brain and all viscera, with congestion, cloudy swelling, hemolysis, and deposition of blood pigment, toxic in origin and probably infectious, the most likely cause being acute, inferior, hemorrhagic encephalitis (polioencephalitis).

Examination of the heart and brain showed:

Heart.—Pericardium smooth and glistening. Size 12 by 9 by 5 centimeters. Moderately firm; right side not dilated. Tricuspid measures 12 centimeters. Leaflets smooth and valve apparently competent. Left auricle not dilated. Mitral valve measures 9 centimeters. Valve apparently competent. Ventricular wall measures 12 centimeters. Muscle pale on section but firm. Weight 320 grams. Aortic and pulmonary valves normal. Aorta elastic and small.

Brain.—Cap strips from dura with some difficulty, especially along the sagittal suture. Vessels of membranes and cortex are congested. Base free from evidence of acute or chronic inflammation. On section, brain showed

acute congestion along with punctate hemorrhages in the cortex, medulla, cerebellum, and in the third and fourth ventricles.

Microscopical examination of the membranes and brain tissue showed the following: Dura markedly thickened and edematous, with round cell infiltration. Pia thickened. Section of cortex shows marked edema, diffuse round cell infiltration, and marked perivascular round cell infiltration, with congestion of blood vessels and deposition of blood pigment.

COMMENT

A search through the literature reveals some interesting case reports somewhat similar in symptomatology to the above, but differing in that they have followed some acute infectious disease, such as scarlet fever, pneumonia, influenza, or dysentery, and in that many of these patients partially recovered, retaining some degree of paralysis.

Definition.—This is a condition characterized by foci of inflammation scattered throughout the gray matter of the brain, not accompanied by suppuration. The cortex alone may be affected. The gray matter about the aqueduct of Sylvius, with involvement of the nuclei of the motor nerves of the eye, is a frequent seat. (Polioencephalitis superior of Wericke.) The nuclei of other cranial nerves may be affected. (Acute bulbar palsy or polioencephalitis inferior.) The cerebellum may be involved. These forms may occur either separately or combined.

Etiology.—Several theories have been advanced as to the causative factor, chief of which are the bacterial and the toxic. The former supports the hypothesis that this type of encephalitis is due to the direct invasion of the brain by bacteria, which causes the primary disease; the latter attributes the cause to a toxic product of an acute infectious disease.

Trauma has been mentioned as a factor. The influence of trauma may be brought about in a purely mechanical way, combining the factors of concussion and inflammatory reaction followed by softening. Again a secondary circulatory infection may intervene, causing a localized or circumscribed inflammatory process.

Pathology.—There are two distinct types of acute hemorrhagic encephalitis which differ clinically and pathologically. One type is characterized by multiple hemorrhages occurring most frequently in the cortex, less commonly in the basal ganglions. There is dilatation of the arterioles and capillaries and transudation of red and white blood corpuscles into the surrounding tissues. The ganglionic cells are secondarily affected, the protoplasm undergoing swelling and the nuclei becoming less distinct. In those cases in which the hemorrhagic areas are extensive and involve the basal nuclei and the walls of the ventricles, the outcome is invariably fatal. In the other type the lesions recall closely those of anterior poliomyelitis,

in fact many cases of anterior poliomyelitis show bulbar involvement so that some writers believe that acute inferior polioencephalitis is a disease closely allied to anterior poliomyelitis, possibly an identical infection with an unusual localization. Histologically, there is evidence of acute destruction of nerve tissue, not all confined to gray matter, together with vascular congestion and lymphocyte accumulations in the perivascular sheaths. Not only do these lesions affect white matter as well as gray, but the meninges are frequently involved.

Symptomatology.—The clinical manifestations are many and varied and, except to those observers who have seen and dealt with a great number of these cases, present no distinctive features. Occurring during an epidemic in which many such cases are prevalent the symptoms might at once suggest the true condition. In isolated instances, however, as in the case here reported, a clinical diagnosis could hardly be made with certainty, especially since the picture presented a syndrome that might well have been mistaken for a cardiac or asthmatic condition.

There may be some prodromal symptoms such as headache and general malaise. More often the onset is sudden, with headache, fever, restlessness, vomiting, rigidity of the extremities, and a rapidly developing coma. The characteristic delirium or sleepiness of Wericke's disease is not found. As a rule in 3 to 10 days there is difficulty in swallowing, with paralysis of the tongue and palate, facial paralysis, and paralysis of the vocal cords. Ocular symptoms are common, such as ptosis, strabismus, and inequality of the pupils and failure to react to light. Respiration is of the Cheyne-Stokes type. In cases terminating in death, the coma increases and respiratory failure occurs (as in our case). However, it must be remembered that the symptoms presented will depend on what part of the central nervous system is chiefly affected.

Course and duration.—The course and duration vary, depending on the extent of involvement. In those cases in which the hemorrhagic areas are confined chiefly to the cortex, the disease may run a course of from several days to many weeks, terminating in partial recovery. In fulminating cases in which the cortex, basal nuclei, and walls and floor of the ventricles are involved, death may follow within 24 to 48 hours after the onset.

Diagnosis.—Among the conditions that must be considered in making a diagnosis are syphilis, cerebral hemorrhage, abscess, tumors, uremic focal symptoms, thrombosis, embolism, cerebrospinal meningitis, and softening of the bulb. The case of Norris (Norris, G. W.: Acute Hemorrhagic Encephalitis, *Internat. Clin.* 1:24-28, 1922) illustrates some of the difficulties encountered in

the diagnosis of this condition. His patient was a man, aged 28, who, after returning from a day's work was found unconscious. There was twitching of the side of the face, a partial paralysis of the right arm and leg, and slight nystagmus. Lumbar puncture revealed a cell count of 1,250, with fluid under increased pressure. Eye grounds were negative. There was paralysis without spasticity. Positive Babinski and Oppenheim with moderate cervical rigidity were present. He had been in the hospital three weeks previously suffering from lobar pneumonia. On the strength of the history, together with the physical findings, a diagnosis of meningitis was made, probably pneumococcic. Necropsy revealed acute hemorrhagic encephalitis.

It was very unfortunate that in our case we were unable to make a more thorough examination. The few hurried observations made were scarcely sufficient to present even a clue to the underlying pathology and it was not until a complete pathological study of sections of the brain was made that we were able to come to a definite diagnosis of the condition present.

Treatment.—The treatment of such cases seems to be largely symptomatic. The prognosis is at best unfavorable. Some cases partially recover but, in these, some defect, either in the form of epileptiform seizures, an obtunded mentality, or some degree of paralysis persists. Many question the diagnosis in cases which are reported as recoveries.

SUMMARY

1. A fatal case of acute hemorrhagic encephalitis, with both inferior and superior involvement, but with symptoms which point to the predominance of the inferior type, toxic in origin, probably infectious, brought on and aggravated by trauma, is reported.

2. The symptoms presented in this case were probably due to the hemorrhages in the base of the brain and in the third and fourth ventricles.

3. The diagnosis is difficult because of the resemblance of this disease to other more common diseases.

4. The prognosis is unfavorable in the majority of cases.

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ULCERATIVE COLITIS—REPORT OF CASE¹

By H. M. WEBER, Lieutenant (Junior Grade), Medical Corps, United States Navy

Dr. J. A. Bargaen of the Mayo Foundation has reported a gram-positive diplococcus as being the probable etiological factor in ulcerative colitis.² Dr. B. B. Crohn has employed with success irrigations of neutral acriflavine in the treatment of this stubborn malady.³ Gentian violet irrigations and *B. Acidophilus* milk have been employed by several clinicians.

The combination of the methods, as used in these cases, may possess some originality, it being reasonable to suppose that the substitution of *B. Acidophilus* for the intestinal flora which seems to be concerned in the ulcerative process, in combination with such efficient irrigation materials as the two dyes have proved to be, should be a procedure approaching almost to an ideal therapy. An irrigation, given very slowly, with 700 c. c. of 1 to 4,000 neutral acriflavine was administered daily at 8 p. m., and one of the gentian violet, similar in strength and amount, at 8 a. m. This was continued for two weeks, sometimes eliminating an irrigation as the comfort of the patient demanded. The gentian violet produced at times some slight degree of discomfort so that this dye was the one preferably omitted. The insertion of the dyes into the colon, however, was agreeably well tolerated, and to hold them for from 15 to 30 minutes caused no pain, the opposite being in fact the rule, for several times the patients remarked on the immediate soothing effect produced, especially by the acriflavine. With the rapid improvement, the irrigations were decreased to one daily, alternating the dyes. *B. acidophilus* milk was begun in doses of 150 c. c. twice daily and, in a week, increased gradually to the usual maximum amount of 1,000 c. c. per day, by mouth.

CASE 1

W. F. T., age 29. Admitted January 28, 1925.

Complaint.—Bowels loose, stools of mucus, sometimes blood-streaked. Movements numbered 5 to 10 per day. Must use his hand when he has the impulse to go to stool to prevent involuntary defecation. Sleep disturbed every night by this urgency to go to stool. Weak and has lost 25 pounds. Has been under treatment, in and out of hospital, for three years. Appetite good.

Family and past history.—Apparently negative.

Present illness.—In 1918, after exposure to "cold and wet" in France, a diarrhea began. Was in the hospital for several months, then was discharged

¹ From U. S. Naval Hospital, Norfolk, Va.

² J. A. M. A., Aug. 2, 1924: "Experimental Studies on the Etiology of Ulcerative Colitis."

³ J. A. M. A., Aug. 2, 1924: "The Medical Treatment of Ulcerative Colitis (non-specific)."

improved but not cured. For two years after this he had a continuation of the symptoms, then the stools began to number as many as 20 in a day. Passed some streaks of red blood. Six stools on day of admission.

Physical examination.—Patient anemic and thin. Prone in bed. On proctoscopic examination there was evident chronic inflammation of the rectum and anus and streaks of blood were visible on the mucous membrane at the end of the proctoscope when inserted to its full length. Some tenderness was present over the descending colon but no masses were palpable.

Laboratory report.—Noguchi negative. Von Pirquet strongly positive. Urine negative. Stools which were liquid and foul and contained shreds of mucus and occasionally blood were repeatedly negative for ameba, ova, parasites, and acid-fast bacilli. Stained smears of feces revealed a predominance of Gram-positive diplococci and Gram-negative bacilli. Culture on blood agar resulted in the growth of a long-chained streptococcus, nonhemolytic.

X ray.—Fluoroscopic examination of chest, esophagus, and stomach, negative. The rapid expulsion of the meal prevented proper study of the colon. Barium enema showed the whole colon moderately contracted. Marked absence of haustral segmentation, especially in mid portion of transverse colon, where the wall appeared more or less rigid but movable en masse. The colon filled rapidly to the cecum.

Progress of the case.—Stools reduced in number. They are now formed and contain no blood, pus, nor mucus. Patient has regained control of sphincter and is without fear of fecal disaster when he passes flatus or has the impulse to go to stool. Has gained 20 pounds weight in six weeks of treatment. Irrigations were discontinued on April 16 but the *B. Acidophilus* milk was continued. He is much pleased with the results and states that he has not felt so well for three years.

CASE 2

F. H. H., age 32. Admitted February 11, 1925.

Complaint.—Many stools with much blood-streaked mucus and blood clots. Gas pains and rumbling in lower abdomen. Tongue sore. Weak. Weighed 160 pounds normally; 115 pounds in June, 1924; and 145 pounds on February 11, 1925; was losing weight rapidly until the treatment was begun. Appetite good.

Family and past history.—Apparently negative.

Present illness.—Off the coast of Cuba in 1917, after being exposed to excessive heat in the fireroom aboard ship, he began to have "inflammation of the bowels." Mucus and blood were passed many times in a day. Recovered partially in a few weeks and had little trouble until December, 1923, when, with much "rumbling of the bowels" and gas, he began to have an increased number of stools which were liquid and frothy with white shreds of mucus but no blood. In April, 1924, blood first appeared. With the passage of much fresh blood and clots in the liquid stools he became weak. He has observed food in the stools which looked much the same as when he ate it.

Physical examination.—Patient fairly well nourished but anemic to such a degree that he looked almost lemon yellow in color. Tenderness over the course of the colon. No masses palpable. Spleen not palpable. Proctoscopic examination revealed the fact that there was much fresh blood being lost higher in the bowel than could be seen.

Laboratory report.—Noguchi and Von Pirquet negative. Fractional gastric analysis revealed nothing of significance. Feces examinations consistently negative for ameba, ova, parasites, and acid-fast bacilli. Stained smears of

feces showed predominance of Gram-positive diplococci and Gram-negative bacilli. Complete blood count, February 3, 1925: Hemaglobin, 40 per cent; red blood cells, 1,480,000; white blood cells, 13,500. Differential: Polymorphonuclears, 72 per cent; small lymphocytes, 16 per cent; large lymphocytes, 8 per cent; mononuclears, 1 per cent; basophiles, 1 per cent; eosinophiles, 1 per cent. Red blood cells showed achromia, anisocytosis, poikilocytosis, polychromatophilia. No normoblasts nor megaloblasts. Color index, 1.4.

X ray.—Gastrointestinal series, fluoroscopic examination of the chest, esophagus, and stomach negative. Rapid expulsion of the meal prevented proper study of the colon. Barium enema showed caliber of the colon reduced 50 per cent in size. Colon filled rapidly and solution passed into the ileum as soon as it reached the cecum.

Progress of the case.—Patient, when admitted to the hospital, seemed doomed to early death. He was excessively weak and his constant loss of blood had resulted in a blood picture which resembled that of a primary anemia in some ways. After the first irrigation he said that it soothed him. The blood passed by bowel decreased in amount and periodical counts were an index to evident improvement. Complete blood count, April 2, 1925: Hemaglobin, 55 per cent; red blood cells, 3,180,000; white blood cells, 9,100. Differential: Polymorphonuclears, 56 per cent; small lymphocytes, 36 per cent; large lymphocytes, 3 per cent; mononuclears, 3 per cent; eosinophiles, 1 per cent; transitionals, 1 per cent. Color index, 0.86. Achromia, poikilocytosis, and anisocytosis very slight. Polychromatophilia hardly present. Red blood cells more definite in size and shape.

The patient became able to be up and about for appreciable periods of time. One relapse occurred, no doubt as a result of a dietary indiscretion. On April 1, an encysted amebic form was found in his feces although the diligent search which was made before treatment was begun had failed to show any. Its identity has not yet been determined, but, on April 14, the above treatment was discontinued and ipecac and its kin were substituted. Injections of fecal suspensions have been placed into the colon of a kitten but, up to the present, with additional examinations of warm, fresh stools, it can not be said whether or not the encysted ameba which was found was that of dysentery or not. The intensive use of ipecac did not give favorable results and the irrigations have been resumed, beginning May 9.

COMMENT

The two cases reported improved rapidly in every respect after having been under treatment over prolonged periods of time before coming to this hospital without obtaining relief as a result of this previous therapy.

The second case may yet resolve itself into one of amebic dysentery; but even though it should, would it be presuming too much to suggest that the penetrating ability of the dyes may be efficient as a means of combating the activity of the marauding ameba as well as the diplococcus of ulcerative colitis?

BLOOD TRANSFUSION¹

By J. L. THORNTON, Lieutenant (Junior Grade), Medical Corps, United States Navy

The relative merits of unmodified blood and blood modified by means of sodium citrate is one of the questions of active interest in connection with blood transfusion.

One of the differences between unmodified and citrated blood is manifested clinically by the more frequent occurrences of reactions with the latter method. Drinker and Brittingham state that after citrated blood transfusion, febrile attacks occur in 60 per cent of cases and a chill in 57 per cent. In Unger's series of cases transfused with whole or unmodified blood, febrile reactions occurred in 10 per cent of cases and a chill in about 3 per cent. This difference in the proportion of disagreeable reactions has been shown by Drinker and Brittingham to be due to changes in the blood platelets which have undergone alterations coincident with early coagulation. Such changes are almost unavoidable in citrated blood transfusions.

Unger has shown also that the addition of sodium citrate to the blood causes an abnormality of the red cells, evidenced by an increased fragility and tendency to hemolysis.

Doctor Bernheim, of Johns Hopkins, who, a short time ago, maintained the position that because of its simplicity the citrate method rendered all other methods superfluous, has recently expressed quite the opposite opinion. He writes:

"In the light of our more mature experience, it is utterly ridiculous to pretend any longer that the reactions that follow the giving of citrated blood are harmless and susceptible to being ignored. Chills and fever and profound shock have never helped any one and to ignore the danger of these sequelæ * * * is little more than admitting a mind closed to certain embarrassing features connected with the procedure * * *. The dread reactions still persist * * * despite the most carefully planned and executed citrate transfusions carried out by men whose long experience with general blood transfusions would preclude the possibility of technical error * * *. Deaths following reactions from citrate transfusions can no longer be considered as accidental and unrelated to the reaction * * *. I have had two deaths from this method of transfusion and I have personal knowledge of about four additional unreported deaths, not to mention numerous other miraculous escapes from death, and I feel quite sure that the experience of many others has been not unlike my own."

¹ From U. S. Naval Hospital, Washington, D. C.

Because of such clinical evidence, laboratory experiments were undertaken to investigate the difference between modified (citrated) and unmodified blood, and it was shown that the plasma from the citrated blood was anticomplementary. An anticomplementary reaction signifies that a substance is present which of itself is able to inactivate complement. This substance is not the sodium citrate itself, nor is it derived from the direct action of the sodium citrate on the serum. These two possibilities were eliminated by control Wassermann tests with the citrate alone and with the serum to which citrate had been added.

The inference, therefore, is that this action took place directly on the cellular elements of the blood. Further experiments were performed to see whether the salt acted directly upon the complement. These consisted of titrating human serum for its complement content, and again titrating after sodium citrate had been added in an amount to that used in transfusions. Such tests demonstrated that sodium citrate affects complement directly, diminishing its amount.

When a citrate transfusion is performed, therefore, blood is being given in which the complement has been diminished in two ways—first, by the production of an anticomplementary substance which inactivates some of the available complement and, second, by a direct destructive action. This is of clinical importance since one of the indications for transfusion is infection, local and general, and complement is a vital factor in the defense against pathogenic organisms. It plays an important rôle in destroying bacteria. The experiment of Wassermann which showed that anticomplement may unite with complement, rendering the individual susceptible to certain infectious diseases may be recalled.

Another well-recognized method of defense against pathogenic organisms is the phagocytic power of white blood cells. As is well known, blood cells free of serum have very little ability to ingest bacteria. However, after bacteria have been acted on by opsonins in serum, they can be ingested by leucocytes. Tests were performed to compare the phagocytic power of white cells as given in transposed or unmodified blood, with similar cells given in citrated blood. As the result of tests of normal white cells it was found that donors may be divided into two groups—those whose cells ingest an average of about 18 bacteria, and those ingesting about 6. If cells of the former group are treated with sodium citrate, the number of bacteria ingested is reduced to about 5, and, if the cells of the latter group are similarly treated, the average is reduced to about 3. This shows that sodium citrate markedly reduces the phagocytic power of the white cells.

Opsonins in serum were next tested in a similar manner. In one series serum was employed, and, in another, citrated plasma, normal unmodified white blood cells being used in both. Cells which with normal serum can ingest about 18 bacteria, can ingest only about 4 when citrated plasma is employed. Cells which in normal serum ingest about 6 bacteria can ingest about 2 when citrated plasma is employed.

The opsonins in the blood are, therefore, greatly interfered with by the addition of sodium citrate. This marked reduction of the power of the blood plasma to prepare bacteria for ingestion and the great destruction of the inherent power of the white blood cells to ingest bacteria render citrated blood of less value than unmodified blood when transfusion is employed to combat infection.

In cases of infection when transfusion is indicated, unmodified blood should be used, and a donor selected whose phagocytic index is high.

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NOTES AND COMMENTS

THE RED CROSS ROLL CALL

Beginning on the anniversary of the signing of the armistice, November 11, and continuing until Thanksgiving Day, there will be held an event which is unique in the country's many observances. It is the annual roll call of the American Red Cross.

The American Red Cross, as the recognized volunteer relief agency of the American people, has in the past year served in 184 disasters in this country, has aided more than 100,000 disabled ex-service men and their dependents every month, has continued to maintain its special services of public-health nursing, instruction in first aid to the injured, in life-saving in water accidents, and many other works of inestimable value to the people of the country.

It has more than 3,000 chapters and local units in every part of the United States, and in addition to this extensive domestic service it has given aid in virtually every quarter of the globe in recent years.

The American Red Cross constitutes a vital force in American life, and the roll call is its invitation to all to participate in its work by making themselves members of its organization. Annual membership costs \$1, of which half is spent in the community where it was contributed.

THE ORIGIN OF CANCER

The search for the cause of cancer, as a first step toward its prevention and cure, has engaged the time and thought of many able research workers for years. The discovery of this cause will be an epoch-making event in the history of medicine and a boon of inestimable value to countless persons who in the future will be saved from the ravages of this most terrible scourge of humanity.

In *The Lancet* (No. III of Vol. II, 1925) of July 18, 1925, "The Aetiology of Malignant New Growths" is discussed by W. E. Gye, M. D., (Edin.) and the use of the ultra-violet microscope in the search for filterable viruses is described by J. E. Barnard, F. R. S., under the title "The Microscopical Examination of Filterable Viruses." These two articles describe the work done by their authors under the auspices of the National Institute for Medical Research in searching for the cause of cancer.

It is too early to say with any assurance that the cause of cancer has at last been discovered, but some evidence at hand points that way and it is not too much to hope that, before long, the experimental work of Doctor Gye will be corroborated by other workers and the first long step in eradicating cancer will have been made.

The work of Gye began with the study of the chicken sarcoma No. 1, described by Petyon Rous in 1911. Rous showed that it could be transferred from one chicken to another by inoculating dead cells or by the injection of a cell-free filtrate. Mammalian tumors have, up to this time, been transferred only by the inoculation of living cells.

According to Gye, Rous proved beyond any doubt that certain tumors could be transmitted by a filterable virus, called by him an "agent" rather than a "virus" because he was unable to prove that the agent is animate.

"The problem which remained when Rous concluded his work on these tumours was the determination of the nature of the filterable agent. Rous and his collaborators brought forward strong evidence in favor of its being a filterable virus—a living but extremely small microbe. Thus the agent is destroyed by exposure to a temperature of 55° C. for 15 minutes; by chloroform and toluene; by phenol in concentrations as low as 0.5 per cent; and by other antiseptics; and the tumour may be kept immersed in glycerine and it still retains its infectivity. * * *"

The theory of the parasitic origin of cancer has been held by many for years, the strongest argument against its acceptance being the large number of organisms which have been brought forward as the true cause. As stated by Gye:

"The 'parasitic hypothesis' of cancer may be stated briefly as follows: Malignant new growths constitute a specific disease and have as their essential cause a specific parasite. To some advocates the parasite is a microbe, e. g., the *Micrococcus neoformans* of Doyen; to others a protozoon; to others again, it is a new form of organism which is capable of existing as 'unorganized plasm,' as a filterable virus, in coccal or bacillary forms or as a fungus."

There is much evidence of a negative character against the parasitic origin of cancer but, as this paper shows, it " * * * is really only destructive of the view that tumours are the pathological consequence of the simple conjunction of host and parasite."

Gye calls attention to the strict specificity of chicken sarcomata. This is very strict for species and for tissues. " * * * If we accept the conclusion that these tumours are caused by living viruses and argue, justifiably, therefrom that other tumours have similar causes, we are inevitably driven, in the present state of knowledge,

to the conclusion that for every species of animal there is at least one group of viruses and for every tissue a particular virus. We are thus led by the logical application of undisputed facts to an apparently absurd position. It does not require a penetrating insight into pathological problems to see that an essential fact is missing and that its discovery may be the key to the general problem of tumours."

It is not necessary to go into any great detail concerning the technical methods employed by Gye in his experiments. It is sufficient to know that he used various tumors of the chicken, rat, mouse, and man in his work; that his cultures were grown anærobically; and that he used great care to prevent contamination.

Earlier experiments showed that "primary cultures" became non-infective in from two to seven days. Gye suspected that this did not "depend upon the death of a virus but upon the disappearance of an accessory chemical factor which governs infection of cells." He conducted further experiments which proved this to be true.

"The experiments show that both in primary cultures and in candle filtrates of the tumour there are two factors which are necessary to the production of a tumour; the one is particulate and is therefore probably a virus; the other being uninfluenced by spinning, is probably a chemical substance. Neither of these factors operating alone will cause the formation of a sarcoma."

In the discussion with which Gye closes his paper, he says:

"It has now been shown that the Rous tumour No. 1 is caused by a virus which has been cultivated; that the mouse sarcoma 37/S can be transmitted with cell-free filtrate; that the rat tumours 9 and J. R. S. and the mouse carcinoma 63 and a human-breast carcinoma all provide a factor which can replace the virus of the Rous tumour in the genesis of a chicken sarcoma.

"The common factor of the last four tumours is almost certainly a virus. The production of tumours with remote subcultures remains to be done. Further, it has now been shown that the virus alone is unable to bring about the malignant transformation of a cell. An adjuvant, fortunately provided in abundance by the chicken sarcoma, is necessary; this adjuvant I have called the specific factor * * *.

"These researches have led me to look upon cancer—using the term in its widest sense—as a specific disease caused by a virus (or group of viruses). Under experimental conditions the virus alone is ineffective; a second specific factor, obtained from tumour extracts, ruptures the cell defences and enables the virus to infect. Under natural conditions continued 'irritation' of tissues sets up a state under which infection can occur. The connexion between the specific factor of a tumour and an irritant remains to be in-

vestigated. Some of the relatively unimportant 'irritants' are known, such as coal-tar, paraffin oils, etc. The virus probably lives and multiplies in the cell and provokes the cell to continued multiplication."

By means of the microscope, described by Mr. Barnard in his paper referred to above, he was able to demonstrate by dark-ground illumination and by ultra-violet photography that growth does occur in cultures of the Rous fowl sarcoma, mouse sarcoma 37/S, and human carcinoma. Without the aid of the specially devised microscope it would be impossible to know that growth has taken place as the cultures are too small to be seen with the ordinary means and the media remain clear. That growth does occur is further proved by the fact that inoculation of the culture has always resulted in infection.

A note by Mr. Barnard and Doctor Gye which follows their papers in *The Lancet* is quoted in full:

"The separate parts of this investigation have now been described, and it remains to indicate how far the results obtained fit together. Our belief that the small bodies seen and photographed are the actual virus depends partly upon the fact that control uninoculated tubes of medium have been invariably blank, and partly upon the correspondence between the microscopical findings and the results of experiments upon animals. This correspondence—allowing for the real difficulties in both parts of the common task—has been so close that, although final proof has not been attained, we are convinced that our conclusions are sound. By final proof we mean the cultivation of the virus from a single colony, or if possible from a single spheroid, and the production of a tumour from the culture thus obtained. This work has been under consideration for a long time, and will be attempted when circumstances permit."

CANCER AND THE SUN

The Boston Medical and Surgical Journal (vol. 192, No. 25) for June 18, 1925, contains an article by Frederick Bryant, M. D., entitled "Cancer and the sun." Although it does not take into account the work recently published by Gye and Barnard on the origin of cancer—abstracted in this number of the BULLETIN—it seems of sufficient importance and interest to justify the following brief abstract:

"Cancer, of all diseases, most challenges modern science.

"Certain facts appear to be established; that cancer is a disease of civilization; that primitive races are practically immune; that certain irritations and some occupations excite cancer; that it is

highly probable that there exist, in the subtle complex of food and habits of modern life, many other cancer irritants which we can not as yet clearly demonstrate; that civilized man seems to have cursed himself with cancer-exciting evils of his own creation.

"J. Ellis Barker brings forth the idea that cancer is excited by modern methods of preserving and preparing food. The factors are destruction of vitamins, refrigeration and overcooking, loss of mineral salts. Constipation, as well as cancer, is practically unknown to the savage but infests civilization.

"The author believes the sun to be a help in prevention and cure of cancer. Vegetable life depends on the sun in a vital way and the human plant equally needs the sun. Civilized man has shut out the sun at every point and now suffers the sad results.

"The idea begins to prevail that cancer never develops in healthy tissues but that it finds easy access to the tissues rendered unhealthy and nonresistant by the chronic irritative poisonings of civilization.

"The logical conclusion is a return to the simple life; less civilized food, balanced with fresh cell life, imparting the highest possible vitamin content. Eat everything that is edible in a raw state. Live out of doors and exercise with the body exposed, as much as possible, directly to the sun.

"If the sun produces such astonishing cures in surgical tuberculosis, why is it not logical to give it a tryout in cancer, which has some points in resemblance?"

SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS

In the Surgical Clinics of North America for April, 1925, (vol. 5, No. 2), Dr. Willy Meyer writes very entertainingly and hopefully on "Surgical treatment of pulmonary tuberculosis." The following abstract contains the important facts brought out in Doctor Meyer's paper.

The early stages of pulmonary tuberculosis are best treated by medical and hygienic methods. At a little later stage, the best treatment consists of gentle compression of the diseased lung and putting it at rest with the help of the insufflation of gas—preferably nitrogen—into the pleural sac. This method can not be used if the visceral pleura has become adherent to the costal pleura. Formerly, patients in whom this had taken place were left to die. Now surgery steps in and many of them are saved.

In 1908, Ludolf Brauer, at the University of Marburg, suggested that "the chest wall with the attached lung" be collapsed by taking away the ribs on the affected side. Professor Friedrich, of the same school, carried out the idea. He made use of the Schede incision,

raising the arm with the scapula and muscles, and removed the first to tenth ribs, inclusive, with their periosteum in their entire length. This was not always successful, as a "flapping of the mediastinum" sometimes occurred and a number of patients died as a result.

Later, Sauerbruch of Zurich, in 1910, advised using only the posterior half of Schede's incision and doing the operation in two stages. He took out the lower ribs first and, about two weeks later, the upper ribs. In this same year, Wilms of Heidelberg suggested excising a short portion of the ribs only, near the spine behind, and the respective rib cartilages with a small piece of the rib in front, and using the remaining portion of the ribs themselves for compressing the lung.

At this time, Professor Brauer went to Hamburg where he performed his own lung surgery. He excised a large piece of rib up to very close to the spine and, if necessary, made another incision in front. He then loosened the periosteum and extracted the ribs. After this procedure, the scapula drops inward and assists in compressing the lung. Brauer's and Sauerbruch's modifications of the original Brauer-Friedrich operation are called "extrapleural thoracoplasty." Wilm's procedure is known as "columnar resection of the ribs." They all put the lung at rest, as does artificial pneumothorax, and induce rapid formation of connective tissue which encapsulates and, at last, replaces the tubercles.

Results of these methods show that in patients who suffer from advanced pulmonary tuberculosis and who can not be treated by artificial pneumothorax because of adhesions between the two layers of the pleura, surgery can step in and cure or improve from 60 to 75 per cent, provided the cases are properly selected.

Meyer describes another operation which promises to do much for these patients—"resection, with extraction from the chest, of the phrenic nerve." It paralyzes the respective half of the diaphragm and leaves the lung "resting on a soft pillow," namely, the half of the diaphragm which does not move any more but which has risen as a consequence of its paralysis. This operation is indicated as a primary step in cases of obstinate hemoptysis, in the infiltrating type of tuberculosis of the lung without cavity formation, and as an addition to the prolonged cure with artificial pneumothorax. It is performed under local and regional anesthesia. Many surgeons also do "extrapleural thoracoplasty" under local anesthesia.

According to Doctor Meyer, "these operations are not difficult technically. They should be taken up everywhere by the general surgeon. At the present moment it certainly is inspiring to see how a wave of enthusiasm with reference to surgical help in patients

suffering from pulmonary tuberculosis sweeps over our States and Canada. Many patients who were considered to be beyond medical and hygienic aid can thus be restored to a good degree of health and ability to work, so that they—before often hopelessly lost—may again take care of themselves and their families.”

SEASICKNESS

The subject of seasickness is one of great interest to naval medical officers. Just as there are many theories as to its causation, so there are many “cures” recommended. Unfortunately, what benefits one person is of no value to another, probably because the underlying cause of the condition is not the same in all cases.

In the thirteenth annual report of the United Fruit Co., for the year 1924, P. H. Desnoes, M. D., port medical officer in New York, of that company, publishes an article on “Seasickness,” based on a review of the literature upon the subject and on his personal observation as well as upon the experiences of the other ships’ doctors of his line. The paper discusses several theories as to the cause of this distressing condition, the arguments supporting these theories and those in opposition to them, the various types of seasickness cases, and gives several methods of treatment.

The author states: “The immediate cause of seasickness is the oscillation of the ship about its various axes, due to the action of the waves and the ground swell. To this constant rise and fall, pitch and roll, is added a secondary minor factor, namely, the fine, unremitting tremor and vibration transmitted from the engines throughout the framework and superstructure of the vessel.
* * * Also, the vista from the decks of wild tumult everywhere—tossing breakers and milk-white foam constantly rushing by—serves to dazzle and fascinate the eyes.”

That the manner in which these factors act to produce seasickness is not a simple one is evidenced by the numerous theories which have been advanced to account for the condition. Among these theories, given in some detail by the author, are:

(1) *The labyrinthine theory.*—This holds that overstimulation of the equilibratory organs (the “labyrinth” consisting of the utricle and saccule, the fine hairs immersed in the endolymph, and the semi-circular canals) causes an overflow of stimuli to other centers close by (vagus, respiratory, vasomotor, etc.), which sets up the phenomena which follow their stimulation, namely, vomiting, irregular breathing, dizziness, pallor, sweating, and so on.

In support of this theory, Doctor Desnoes mentions the fact that Kriedl was able to induce salivation and vomiting in dogs by whirl-

ing them on a revolving platform. Also that Lewis Fisher, working with humans in the "Barany Chair," found that frequent stopping and starting was more likely to induce nausea than was continuous revolution.

"James, writing in the American Journal of Otology, noted that congenital deaf mutes were never seasick. Infants and those who had bilateral disease of the internal ear, with destruction of the labyrinth, are similarly immune. It therefore seems rather well established that seasickness does not occur in those who, as a result of disease, operation, or lack of development do not possess a complete and functioning equilibratory apparatus * * *."

(2) *Muscle-sense disturbance*.—Muscle is well supplied with afferent nerve fibers. One class of afferent impressions consists of impulses which "enable us to localize in space the position of the limbs, head, eyes, and other parts of the body. When any one is at sea, these latter impulses are being constantly excited by the continual oscillation of the ship, and confusion results from the impossibility of perfectly coordinating the irregular and unwonted stimuli * * *."

(3) *Eye strain as a factor*.—This may play a small part in producing seasickness with some people. That it is not a necessary factor is shown by the fact that blind people become seasick.

(4) *Peripheral Vagus-nerve irritation*.—The movable organs of the abdominal cavity make wider and more irregular excursions than usual because of the motion of the ship. These affect the irritability of the nervous mechanism and lead to nausea.

(5) *Psychic stimuli*.—These play a large part in the seasickness of neurotic individuals.

In discussing the various theories mentioned above, the writer says:

"It is our opinion that all of the various factors described in the foregoing theories play some rôle in the causation of seasickness. According to the individual susceptibility, some factors are undoubtedly more prominent than others. Labyrinthine over-stimulation is probably the most potent factor in the average healthy person. However, the sum total of these effects is to deluge the brain with a bewildering flood of nocuous impressions, and the result is a condition which may be described as 'psychic shock.' The power of inhibition possessed by the cerebral cortex over the subcortical centers plays the most important part in the establishment of immunity. A defensive reaction is set up, as a result of which the threshold values of these harmful stimuli are raised so that either they no longer register in the brain, or their registering is completely ignored * * *."

The symptomatology of seasickness is too well known to naval medical officers to require repetition here.

In healthy persons there are no complications; but, of course, patients with heart disease, gastric or duodenal ulcers, or gallstones may have these conditions made worse by excessive vomiting. Acidosis and acetonemia have been noted to accompany seasickness, and a diet directed against this has been found of benefit.

As to treatment the author says: "The great majority of passengers can avoid seasickness by adopting, a week or so before sailing, a few rules of hygiene and diet. Abundant sleep must be obtained to place the central nervous system in as good a functioning condition as possible. Exercise in the open air * * * is important to prepare for the fresh and stimulating air of the marine climate and to tone up the reflexes, both muscular and visceral. * * * Avoidance of excesses of all kinds is, needless to say, important."

Proper bowel elimination should be achieved, but drastic catharsis is not indicated.

"The important object in dieting is to establish a reduced hydrogen ion (p H) concentration in the blood and to store up in the system plenty of buffer substances because of the tendency to acidosis. The salts of meats, cereal, and legume foods have an acid reaction; those of sugar, fats, and oils are neutral; while the salts of tubers, fleshy roots, leafy, green vegetables, and fruits, especially those of the citrous variety, are alkaline. The last group, therefore, must be consumed in an adequate diet in sufficient quantity to neutralize the acidity of the first group and to maintain or, if possible, increase the alkaline reserve of the blood. The following articles should be strictly avoided: Sugar, pies, cakes, pastries, candies, and other sweets, as these remain longest in the stomach and are apt to cause fermentation, with increased acid formation.

"When symptoms of seasickness occur an attempt should be made to discover which one of the five main factors previously discussed is operating, or, if more than one, which is operative to the greatest extent. The reason why advertised seasickness remedies so often fail is that they are usually directed against only one factor."

In cases of seasickness due to the labyrinthine factor, many recommend drugs of the belladonna group combined with strychnine. These are best given hypodermatically. Doctor Desnoes states that he has secured better results with hyoscine hydrobromide. His routine treatment in mild cases consists of giving $\frac{1}{16}$ gr. hyoscine hydrobromide, by mouth, every hour until the patient is relieved or until the physiological effects are obtained. In cases with much depression, $\frac{1}{80}$ gr. strychnine sulphate is added to this, and for severer cases with much vomiting, the medication is given hypodermatically. In order to combat the psychic element which enters into most cases, he gives chlorbutanol (chloretone) grs. 5 to 10 in capsule, repeated in eight hours if necessary. Other hypnotics which may be

used are barbital, barbital sodium, luminal, trional, or sulphonal. Allonal has been reported upon favorably by some of the ships' doctors.

In cases with intense headache, pituitrin has been used to increase the rate of production of cerebrospinal fluid through stimulation of the secretory activity of the choroid plexus. Some observers have used nitroglycerin on the assumption that there exists an anemia of the brain.

In another type of seasickness the gastrointestinal tract is chiefly at fault. In regard to these cases, the writer says:

"The treatment here must be directed first to the alimentary tract. Thorough lavage of the stomach should be effected by making the patient drink large quantities of warm water with bicarbonate of soda, and emesis is produced by tickling the pharynx. A final glass should contain a Seidlitz powder, which the patient must endeavor to retain. Thereafter there must be absolute rest until the bowels have operated well; a small enema may be necessary to start the bowel action. As the conception of the pathology is one of delayed waste material in the bowels, with reflex delay in gastric emptying, our efforts should be directed to prevent this condition. We recommend fluid extract of cascara sagrada in sufficient dosage, three time a day, strychnine, grs., $\frac{1}{80}$ t. i. d., and a diet small in bulk and easily assimilated. Such a diet may include milk, toast, ice cream, cereals, boiled eggs, stewed fruit, puréed vegetables, and a little chopped chicken or other meat. Rest in a recumbent position for one hour after each meal is very helpful."

Doctor Desnoes mentions the use of cocaine only to condemn it. He believes the benefit sometimes obtained from packing the external auditory canals with gauze is chiefly psychic.

"Cases of excessive vomiting are met with occasionally that tax our efforts at control. After the usual remedies are tried, including the mustard plaster applied to the epigastrium, morphine sulphate grs. $\frac{1}{8}$ to $\frac{1}{4}$ by hypo. combined with atropine sulphate grs. $\frac{1}{100}$ to $\frac{1}{50}$, is the court of last resort. Provision must be made for the curious fact that the drug most potent in checking vomiting is followed by vomiting as a common after-effect. After the patient awakes from sleep, induced by the drug, he should be directed not to raise his head from the bed for several hours. * * * If neither food nor water can be retained in the stomach for 12 hours or so, no time should be lost before resorting to rectal alimentation. The only substances of food value that can be absorbed from the lower intestines are amino-acids, simple sugars, and alcohol. The old method of trying to maintain nutrition by introduction of ordinary food-stuffs per rectum has been shown to be inefficacious. Skimmed and

pancreatinized milk may be used, or the clysma suggested by Smithies.

Normal salt solution q. s.	Oz. VIII (240 c. c.)
Alcohol, 50%	Oz. 1 (30 c. c.)
Glucose	Oz. 1 (30 c. c.)

Karo corn syrup is a concentrated solution of practically pure glucose, and is easily obtainable. This injection should be administered at body temperature by the drop method, with the patient on his back and the hips elevated; it should be repeated two or three times during the day. A bulk of 10 ounces (300 c. c.) should not be exceeded. Needless to say, feeding by mouth should be resumed as soon as possible, commencing with such easily digestible articles as milk, bouillon, tea, ice cream, arrow-root crackers, and the like."

The author, in conclusion, states:

"The purpose of this article will have been served if it stimulates a more critical spirit of inquiry into the subject of seasickness by the ships' doctors of the United Fruit Co., and if it is the means of freeing from one of the terrors of the deep a large number of 'those who go down to the sea in ships.'"

Likewise, the object of this full abstract of the paper will have been accomplished if it serves to make the lot of our naval personnel at sea a more comfortable one and by that means makes for greater efficiency.

TREATMENT OF WASSERMANN-FAST SYPHILITICS WITH BISMUTH

Lawrence K. McCafferty, M. D., and J. Arnot MacGrégor, M. D., of the New York Skin and Cancer Hospital, report in the July, 1925, number of the American Journal of the Medical Sciences (Vol. CLXX, No. 1) the results of treating 25 asymptomatic syphilitics, all of whom had definitely positive blood Wassermann tests subsequent to intensive courses of treatment with the arsenicals and mercury. None of the cases treated showed any traces of a positive spinal fluid.

One course of the bismuth treatment consisted of intramuscular injections of potassium and sodium tartrobismuthate twice weekly until 16 injections had been given.

After one course, 11, or 44 per cent, of the 25 gave negative or plus-minus Wassermann reactions, 9 were unchanged, 5 were reduced to some degree.

After a second course there was further improvement over the first course of $22\frac{2}{3}$ per cent, while there were 9.5 per cent relapses.

Only 11 patients completed the third course.

The average improvement after three full courses was 64.7 per cent; 22.96 per cent remained unchanged and 13.8 per cent reverted.

In only four cases did even a faint trace of albumin appear in the urine, and only one patient showed any cutaneous eruption, this clearing with stoppage of treatment.

The injections were not more painful than those of mercury.

The following conclusions are drawn by the writers:

"1. Bismuth should be given in all Wassermann-fast syphilitics.

"2. Albuminuria is not produced more frequently with bismuth than with other antisyphilitic agents.

"3. No untoward effects are met with in bismuth therapy when properly administered."

STERILIZATION OF WATER WITH TINCTURE OF IODINE

The following abstract appeared in the *Nation's Health*, vii: 5 (May, 1925):

"Batti (*Rev. Hyg.* XXXIX, 319-320) is reported by Chemical Abstracts as recommending the sterilization of water with tincture of iodine. Five drops of a mixture of iodine (5 gr.), potassium iodid (2 gr.), and ordinary grain alcohol (100 gr.), are required per liter of water, 5 drops of sodium thiosulphate being added 20 minutes later to remove yellow color and taste. Six drops gave adequate treatment for soldiers' canteens. The solutions keep indefinitely."

NURSE CORPS

VALUE OF NAVAL HOSPITAL LIBRARIES

By ISABEL DuBois, Director of Libraries, Bureau of Navigation, Navy Department

It can hardly be said that naval hospital libraries existed prior to the World War. Before that time the various hospitals had collections of books, some of which had been supplied by the Bureau of Medicine and Surgery, some of which were gifts, and some of which had been left behind by patients. In practically no instance were these collections organized, and in no case was there a librarian. One officer relates that when he was stationed at the Norfolk Naval Hospital 35 years ago the library consisted of a number of volumes known as the Home Library, all bound in a dull red. Thirty years later when he went to the Chelsea Hospital he found the same "Home Library" the entire book collection of the hospital. He says he does not believe any were ever removed from the shelves. The titles were all standard fiction or other solid reading, and the dull monotony of several shelves all alike would deter any but a most enthusiastic reader. The Navy Department took no interest in the organization of these libraries, nor hardly any cognizance of their existence. No attempt was made to supply them regularly with books, although at the same time books were being supplied to ships. Hospital libraries depended solely on the interest of the commanding officers.

At this same time libraries in civilian hospitals existed in rare instances, and then usually in the private ones, such as the McLean Hospital at Waverly, Mass. This hospital was the first to insist on the value of a carefully selected library for its patients with a trained resident librarian in charge. When attention was given to the recreation of the well in the Army and the Navy during the World War, it also came about that similar attention was directed toward the sick, with the result that the American Library Association supplied books and professional librarians to many of the hospitals, both in the Army and in the Navy.

These libraries, after the work of the American Library Association for the Navy had finished, were considered such an essential asset that the work was taken over by the Navy and has become an integral part of the service. The Bureau of Navigation, first

under the morale division, and later under the training division, assumed the upkeep of these hospital libraries, including the services of librarians. At the present time, libraries of approximately 5,000 volumes exist in the principal Naval Hospitals, and eight librarians are supplied to as many hospitals, while others, such as Quantico, Pensacola, Parris Island, and Newport, receive the part-time service of the librarian attached to the station.

A hospital library consists of two parts—first, the books, and second, the librarian. It is obviously impossible to have a library without books, and although it is equally important to have a librarian, it is not quite so obvious. A library without a librarian has been compared to a case of surgical instruments without a surgeon.

The location of the library varies with the hospital, depending, of course, upon local conditions. In places where a recreation room exists the library is usually adjacent to this room, as it should be. In all cases there have been developed attractive, pleasant quarters with reading tables, comfortable chairs, and books conveniently arranged on the shelves. Comment has been made on the contrast between the appearance of the shelves of a naval hospital library and those of the average public library. In the first, the books are all in their original publishers' binding, which makes for variety of color and attractiveness on the shelves. In the latter are always numbers of rebound volumes with much the same bindings. A comfortable room, centrally located, has much to do with the usefulness of a hospital library.

The books themselves are as varied as the needs of the hospital demand. The larger proportion is, of course, fiction, and this fiction varies from the popular western story to the more solid type generally known as a character study. The nonfiction covers, in so far as is necessary and funds permit, the entire field of knowledge. There are, of course, numerous books on naval science and technical subjects, for convalescence often presents a good opportunity to study for examinations. There are included also books of travel, history, biography, which are read solely for recreation; and anything which will interest the patient in a wholesome manner.

These libraries have in all cases been organized in the orthodox manner. The books are classified on the shelves by subject, and the necessary catalogues and other records kept. This organization is only a means to an end, but it is essential if proper service is to be given.

All books and all records increase in value when in the charge of a competent librarian. Their value also decreases or increases

according to the ability of the librarian. We have been very fortunate in the Navy to obtain women of ability and character for this work. It is primarily the duty of the librarian to see that each man and officer has the book that fits his need. To bring this about, she must have, in the first place, an intimate knowledge of the individual books. It is hopeless to attempt to interest another with anything with which one is not familiar. The librarian also needs a knowledge of people and human nature and the psychology of the sick as distinguished from that of the well. Combined with these qualities, she must possess tact and diplomacy, as well as a pleasing personality. She must be aggressive but not too much so; and she must firmly believe in the mission of the library.

Given a collection of books, and the service of such a librarian, what is the value of a hospital library? It must fill the needs of many types of people. There are, first of all, the patients, for whom the hospital exists and hence who are the first consideration. It has become an axiom in the medical profession that a contented mind aids recovery. To this end a patient before an operation requires one type of diversion, a patient after an operation another. The tuberculosis patients, with the accompanying morbidity, have a different need, while the mental cases present still another problem, as do also the beneficiaries of the Veterans' Bureau. The psychology of the ex-service man differs from that of the Navy patient in most cases, although one doctor has said that they are only men. Convalescents, recovering from typhoid or other diseases, are apt to be lazy minded and need to be stirred up. The librarian is at hand to help to awaken their interest in new ideas and projects. For the ambulant patient the library affords a quiet place where he can browse at his leisure, entirely removed from the ward atmosphere.

The librarian studies these types of patients and the individual variations from type. When the library book truck is wheeled through the wards it contains books and magazines selected by her to suit all requirements. It is probably here in the ward in this work with the individual that the value of the librarian is most apparent. The mental state of an ill man is like that of a child about to go to sleep, the time when suggestion can most effectively be used. With this knowledge, plus a knowledge of the psychology of the man as influenced by his disease and a knowledge of books, the librarian is able to supply at this time the book which fits the mental need of the individual in the same manner the doctor prescribes the medicine for his physical need. In this way the library offers a new aid to therapeutics, that of the mind, or mental, for which one hospital executive has coined the term "bibliotherapy."

There is also the staff of the hospital, the corpsmen, doctors, and the nurses. Their interests are not identical with those of the sick. There is the corpsman who has spent all his money, and who wants something to keep him entertained, since he can not go ashore. There are the men who are reading in preparation for examinations, and there are all those who just normally use the library as they would on the "outside." The nurses have naturally different interests from either the doctors or the corpsmen, and a different type of reading matter is necessary for them. For the doctors their recreational needs must also be supplied from this library, while their professional reading is provided in the medical library, a distinct collection.

The library and the librarian mean to each of these types, and to each individual, a different path to the same destination, namely, information, entertainment, aid to culture, and whatever else may be found between the covers of books. While books, like friends, can not be chosen for us entirely, it is essential to be guided into congenial circles by one already acquainted there. This is the sphere of the librarian and constitutes her value to the hospital in demonstrating the uses of the library in the hospital community life.

TREATMENT BY PHYSIOTHERAPY

By FRIDA KROOK, chief nurse, United States Navy, and MARY M. HECK, nurse, United States Navy

Many times the question is asked, "What is physiotherapy?" The Hospital Corps Handy Book gives the following definition of the word: "Physiotherapy is the application of physical remedies in the treatment of diseases and injuries." In most hospitals it includes massage, medical gymnastics, thermo or radiant heat therapy, actinic or ultra-violet ray therapy, electrotherapy, and hydrotherapy.

It was early in 1918 when preparations were being made to take care of the great number of disabled men who would soon be coming back home wounded in body and sick in mind, that the question arose as to what could be done outside of general hospitalization for the many cases of nerve injuries, amputations, and the many other afflictions due to war; it was then that physiotherapy seemed to fill a most urgent need.

Treatment with physical means is not new, but very little was known of the work in the Navy until 1918. It was at the naval hospital, Brooklyn, N. Y., that the first department was organized. One or two rooms seemed quite adequate to take care of the patients, but the number increased so rapidly that it was necessary in a

very short time to enlarge the department many times. The best of equipment was procured and the training of personnel was soon inaugurated. Instruction has been given to nurses and hospital corpsmen in the physiological effects and in the proper technic of the application of the different modalities.

Almost everybody working with physiotherapy shows a great deal of enthusiasm. The reason is that in most cases we get results. It means a great deal of hard work, perseverance, and an unlimited amount of patience, for in many instances it requires months of almost constant treatment before desired results are obtained, and quite often the question is asked, "Is it really worth while?" After hearing the many expressions of appreciation from the patients, the commendation of the medical officers, and in view of the fact that convalescence has been hastened fully 50 per cent in many cases, one feels that it is indeed most essential and gratifying.

We find that physiotherapy with its many branches is not a cure-all in any sense, but used in conjunction with internal medication, proper surgical intervention when indicated, and special attention to diet, it is indeed a most helpful adjunct. In fracture cases, by starting treatments as soon as splints can be removed temporarily, we usually can prevent muscular atrophy, stiffness of joints involved, shorten the time usually required for healing, and sooner restore an injured member to its normal condition, thus greatly lessening the number of sick days, which, especially in the military services, is a factor of considerable importance to the patient and to the Government. If one asks a patient who has had a limb bandaged to a splint or in a cast for a longer or a shorter period how he feels after a carefully given whirlpool bath followed by massage and exercise, he usually expresses his delight and says the limb feels as though it had new life, and he is glad to return for further treatment.

What massage and intelligently given exercises will do to atrophied muscles everybody knows. Hemiplegic and peripheral nerve injury cases are very interesting, but they take a great deal of time, patience, and persistence both from the nurse and the patient. We are thrilled when we obtain reaction of *re-generation* following weeks of *de-generation*. Sprains respond almost immediately to the indicated treatment and rheumatic and arthritic patients, nephritic and heart cases, get comfort from the electric cabinet bath followed by properly regulated showers; patients complaining of nervousness and weakness improve under hydrotonic baths.

The majority of patients improve under the application of heat and light from the large "deep-therapy" lamps and carbon arc lamps. The ultra-violet ray treatment, given for tonic purposes,

with its special technic, gives wonderful results. Most patients feel and show improvement under this treatment. Infected wounds, osteomyelitis, tubercular sinuses, and old ulcers usually heal under the treatment. It is most surprising to note the results in nearly all skin diseases after a few applications of the ultra-violet ray. Psoriasis as a rule responds to ultra-violet radiation, but the treatment must be severe to accomplish results. A patient with boils or carbuncles will avoid the knife if he is given ultra-violet radiations before the tissues have broken down. The dreaded erysipelas has found a very powerful foe in ultra-violet rays.

In pneumonia, diathermy treatments are given. The patients seem to get more comfort and rest from the heat caused by the diathermy current through the chest than from any other treatment. They gain their strength and recover much faster when diathermy has been given during the acute stage.

Under the heading of electrotherapy come treatments with high frequency (diathermy), static, galvanic, faradic, and sinusoidal currents. All of them have a very valuable place to fill in all muscular reeducational work, in sprains, arthritis, neuralgia, high blood pressure, sleeplessness, etc. Diathermy is a palliative that can be used in almost any "itis." It is contraindicated in diabetes, inclosed pus, and susceptibility to hemorrhage.

As time goes on physiotherapy will very likely be used more and more by the medical profession. It has been most encouraging to watch this work expand until to-day in most of the larger naval hospitals there can be found modern and model physiotherapy departments.

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,

U. S. Naval Medical Bulletin,

Bureau of Medicine and Surgery, Navy Department,

Washington, D. C.

For review.

HOW TO LIVE, by *Irving Fisher, Ph. D., Professor of Political Economy, Yale University, and Eugene Lyman Fisk, M. D., Medical Director, Life Extension Institute, Inc.* 18th edition. Funk and Wagnalls Co., New York, 1925

In the foreword written by Wm. H. Taft in 1915 for the first edition of this work it is stated that "the most direct and effective means of lengthening human life are at the same time those that make it more livable and add to its power and capacity for achievement." Since that time the application of these means has resulted in an increase in the normal expectation of life by 13 years—that is, from 45 to 58. The means by which this has been accomplished are discussed in "How to Live." They are so clearly and simply stated that anyone who cares to do so may follow them with ease. That many are doing so is evidenced by the fact that the book has now reached its eighteenth edition.

The Life Extension Institute was among the earliest advocates of the principle of the periodic health examination, a principle now accepted by the American Medical Association and upon which much stress is laid in the Navy.

The present edition has been thoroughly revised and its subject matter rearranged. The first part deals with the principles of hygiene and the philosophy of healthful living, while the second part shows how these may be applied.

Sixteen rules of hygiene dealing with air, food, poisons, and activity are given and discussed. To the medical reader these contain nothing new, but the average lay reader will not be so familiar with them and will find in them much to benefit him in his daily living.

One chapter is devoted to alcohol. In it statistics from various large life insurance companies are given to show that the death rate among even moderate drinkers is considerably higher than that

among abstainers. With the advent of prohibition and the consequent increase in the consumption of moonshine liquors this difference in the mortality rate of the drinkers and nondrinkers will, of course, be more marked.

Tobacco is discussed in another chapter. Its use is advised against and its bad effects noted.

Avoiding colds, focal infections, organic disease, and eugenics have chapters devoted to them in which much valuable advice is given.

Such a book as this, intended as a guide for persons in all walks of life, can but do good if its advice is followed, and its study by the medical man will render him better able to answer intelligently the many questions asked by his patients and acquaintances as to how he or she should live in order to attain an old age that will be more than just an uncomfortable existence.

INFECTIONS OF THE HAND, by Allen B. Kanavel, M. D., Professor of Surgery, Northwestern University Medical School; Attending Surgeon, Wesley Memorial Hospital, Chicago. Fifth edition. Lea and Febiger, Philadelphia, 1925.

Infections of the hand are a frequent cause of many days being spent on the sick list and failure to treat such infections properly is a not unheard-of cause of permanent loss of function of the part and, consequently, of separation from the service of men otherwise physically fit.

When such an authority as Kanavel devotes a book of 470 pages to such a seemingly small section of surgery as this and his book reaches its fifth edition in so short a time, it is proof that the subject is considered an important one.

Contractures, loss of tendons, and ankylosis of joints are sequelæ of infection of the hand that must be guarded against. Kanavel tells how these may be avoided and how their effects may be overcome by proper physiotherapy if they do develop.

The object of surgery of the hand is not only to overcome infection but also to preserve the function. This, as the author tells us in his preface "presents a complicated problem that should be uppermost in mind from the very inception of treatment."

The plates are excellent and the descriptive text clear and concise.

The book should be in the hands of every surgeon and of every physician who is called upon to perform office surgery, particularly those whose work brings them in contact with industrial accidents in which infection so often arises. It will fill an important place in the library of naval surgeons.

CLINICAL FEATURES OF HEART DISEASE, an Interpretation of the Mechanics of Diagnosis for Practitioners, by *Leroy Crummer, M. D., Professor of Medicine, University of Nebraska*. Paul B. Hoeber (Inc.), New York, 1925

Medical literature of to-day evidences the extraordinary revival of interest in everything that pertains to the heart. Hundreds of articles relating to cardiovascular studies are appearing annually in publications the world over. In the front line of these writings Doctor Crummer's work must be ranked. What an eminent authority, Libman, experienced on reading the manuscript will undoubtedly be the experience of all who read this refreshing book: "I found it so interesting, profitable, and enjoyable that I kept on reading until I had finished it at one session and had marked numerous passages for rereading." The present reviewer has marked so many sections that he is reluctant to fail to mention all of them here.

The chapters on history taking, inspection, palpation, and percussion are a veritable gold mine of information. That on auscultation is especially outstanding. One of the greatest problems of to-day is the recognition of what is normal, and Doctor Crummer in a concise manner aids in the establishment of such standards. His discussion of normal sounds and his comparisons of right and left heart are unique. His encouragement to students and practitioners who do not have access to costly mechanical aids is timely. Far too many these days hesitate or refuse to make diagnosis without the electrocardiograph, polygraph, X ray, etc. His block method of digitalization is most interesting, practical, and sensible.

Of especial interest and value to military medicine is the discussion of athletics. It would pay every naval medical officer to read carefully the recorded experiences of the author in this field. Too often is the boxer, runner, and candidate for the crew pronounced physically qualified after superficial examination only.

To the surgeon much of value is available in the discussion of the problem of the proper selection of anesthetics. Pointedly does Doctor Crummer remark that "The question of anesthesia and operation is entirely a question of the amount and length of time an added burden will be thrown upon the heart. The compromise of operation under local anesthesia should never be attempted. Local anesthesia adds to the discomfort of the patient, but does not lessen the risk."

Here is a book that is delightfully refreshing and stimulating throughout. Though bold, emphatic, and in several respects original in his viewpoints, the author never departs from the realm of common sense.

HAND ATLAS OF CLINICAL ANATOMY, by *A. C. Eycleshymer, B. S., Ph. D., M. D., Dean of College of Medicine and Director of Department of Anatomy, College of Medicine, University of Illinois, and Tom Jones, B. F. A., Director of Anatomical Illustration and Instructor in Anatomy, College of Medicine, University of Illinois.* Lea and Febiger, Philadelphia, 1925.

Most medical officers of the Army and Navy are familiar with the Manual of Surgical Anatomy prepared by the authors of this atlas during the war for the use of the Medical Corps of both services. The present work is an outgrowth of this smaller volume and shows the same careful attention to detail and clearness that characterized the remarkably fine illustrations in the earlier edition. Many of the drawings in this work—of which there are 395 in all—are new and are an improvement upon those which appeared in the manual. Especially valuable are the muscle drawings which show very clearly the relation of the muscles to the bony framework. The anatomy of the female organs has been included and a complete and self-explanatory index is added which does away with the necessity for any descriptive text.

Anyone doing surgery will find this atlas a most valuable addition to his library.

TEXTBOOK OF DIFFERENTIAL DIAGNOSIS OF INTERNAL MEDICINE, by *M. Matthes, M. D., Professor of Medicine and Director of the Medical Clinic, University of Königsberg.* Authorized translation of the fourth German edition, with extensive additions by *I. W. Held, M. D., and M. H. Gross, M. D.,* New York City, N. Y. P. Blakiston's Son and Co., Philadelphia, 1925.

This is a standard German textbook, now made available for English-speaking practitioners. It is a very thorough and complete presentation of the subject, equal to the best books on this subject that we have seen. The translators' notes are of distinct value, helping to harmonize the German point of view with our own.

It is a bulky volume, weighing 6½ pounds, and the style is equally heavy and laborious, as befits the land of its origin. Anyone who has plenty of time to sit down and dig out the information he needs will undoubtedly find it here. It will prove to be a valuable reference book for libraries.

A SYNOPSIS OF SURGERY, by *Ernest W. Hey Groves, M. S., M. D., B. Sc. (Lond.), F. R. C. S. (Eng.), Surgeon to the Bristol General Hospital; Professor of Surgery, Bristol University; Examiner in Surgery, Universities of London, Liverpool, Leeds, and Sheffield.* Seventh edition. William Wood and Company, New York, 1925

If the reviewer were preparing for an examination in surgery, or serving on a small ship with only a few books available, he would spend \$5 for this book and believe it a good investment.

It was the author's object to include all important matter and also to present the subject briefly and clearly. These are two difficult

ideals, but he has been remarkably successful in his efforts. It is all here, etiology, pathology, anatomy, symptoms, diagnosis, treatment, even prognosis—boiled down, compressed into tabloid form, epitomized; in short, a synopsis.

THE INTERNATIONAL MEDICAL ANNUAL, a Yearbook of Treatment and Practitioner's Index. Forty-third year, 1925. William Wood and Company, New York

This annual volume is planned with the object of condensing the important developments of the year into a single volume for ready reference.

There are a number of somewhat similar publications, but this one seems to the reviewer to be the most complete and most practical. The majority of the contributors are British, and so the medical literature of their country is most fully covered. This seems to be an advantage to us, since we are already more familiar with our own literature than with the European. Also it is probable that the important articles in American periodicals are more accurately estimated from a distance.

It will be found an exceedingly useful volume.

PHYSICAL DIAGNOSIS OF DISEASES OF THE CHEST, by *Joseph H. Pratt, A. M., M. D.*, and *George E. Bushnell, Ph. D., M. D.* W. B. Saunders Company, Philadelphia, 1925

A very interesting and readable book on physical diagnosis, in which is described in detail the methods of eliciting physical signs, the logical reasoning of their interpretation, and the physical laws upon which the interpretations are based.

While there is necessarily much reference to the work of others, a reading of the book leaves one with the impression that he is dealing with the work of two earnest students of physical diagnosis whose opinions are of value.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY, by *W. A. Newman Dorland, A. M., M. D., F. A. C. S., Lieutenant Colonel, M. R. C., United States Army, member of the Committee on Nomenclature and Classification of Diseases of the American Medical Association, etc.* Thirteenth edition, revised and enlarged. W. B. Saunders Co., Philadelphia, 1925

A new edition of Dorland's Medical Dictionary is published whenever the number of new terms appearing in medical literature justifies it. The present edition defines about 2,500 new words which have found a place in the literature since the last revision was made. As in its predecessors, the matter in this edition is arranged with a view to easy reference and the definitions are complete and full without being cumbersome. Every medical man will want this new dictionary within easy reach.

INTERNATIONAL CLINICS. Edited by *Henry W. Cattell, A. M., M. D.* Volume II, Thirty-fifth series, June, 1925. The J. B. Lippincott Co., Philadelphia

The second volume of this series contains 18 articles dealing with various branches of medicine. They are of the same high class as those which have appeared in earlier volumes. Especially interesting is the article by Doctor Cattell, in which he describes several of the portrait medallions of prominent medical men modeled, many of them from life, by Prof. R. Tait McKenzie, of the University of Pennsylvania. It is illustrated by cuts which show the high character of McKenzie's work, in which work he is the acknowledged master.

DYSENTERY: ITS DIAGNOSIS AND MANAGEMENT THROUGH THE MICROSCOPE, is a timely and valuable contribution by F. G. Haughwout, of the Bureau of Science, Manila, P. I., and Maj. G. R. Callender, Medical Corps, United States Army. It is illustrated by excellent photomicrographs of exudates from patients with dysentery.

PYE'S SURGICAL HANDICRAFT. A manual of surgical manipulations, minor surgery, and other matters connected with the work of house surgeons and surgical dressers. Edited and largely rewritten by *W. H. Clayton-Greene, C. B. E., B. A., M. B., B. C. (Camb.), F. R. C. S. (Eng.)*. Ninth edition. William Wood and Co., New York, 1924.

As stated in the title, this is not a textbook of surgery, but is intended to instruct house surgeons and others who have to do with surgical dressings in the art of first aid, the application of dressings and bandages, the after treatment of fractures and dislocations, and to enable them to perform the minor surgical operations with success and with as little discomfort to the patient as possible. All this it accomplishes satisfactorily. In short, the book is an enlarged compend and a good one.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

CARE OF MEASLES PATIENTS IN COLD WEATHER

The Bureau of Medicine and Surgery found it necessary during the World War repeatedly to emphasize the importance of protecting measles patients from exposure to cold and of exercising the greatest possible care to prevent cross infection and the development of fatal complications.

Measles is a serious disease in the Navy during the winter months in peace as well as in war, and with the approach of another winter it is timely to invite the attention of medical officers to certain conclusions which are supported by analyzing the vital statistics of the Navy.

In 1917 and 1918 measles caused a good many deaths in the Navy. With the tremendous expansion which the Navy was undergoing, inadequate housing facilities for the rapidly increasing personnel and more or less subordination of all matters to efforts to get men into the service, train them as rapidly as possible, and move them into places where they could be of value in carrying out the mission of the Navy, outbreaks of most of the communicable diseases of the respiratory type were to be expected and they occurred. Conditions in civilian population groups also favored the development of epidemics of mumps, measles, scarlet fever, diphtheria, cerebrospinal fever, and pneumonia. In 1917 there were also many outbreaks of influenza. That influenza was showing indications of becoming pandemic was recognized by the Navy in the autumn of 1917, but with the exception of the health officer of New York and the health officers of a few other cities and a few industrial medical departments, including that of the Ford Motor Co., few paid much attention to the probabilities and the damage which was being suffered until 1918.

There were so many hazards of cross infection in both 1917 and 1918, with several communicable diseases epidemic at or about the

same time in the spring of 1917 and during the winter and spring of 1918, with unusual types of pneumonia prevalent, that high case-fatality rates for measles were attributed largely to the concurrent prevalence of other communicable diseases and war-time conditions which tended to increase the numbers of healthy carriers of pneumococci, streptococci, and other pneumonia-producing microorganisms. In view of the conditions then existing the epidemiological history of measles in the Navy since the World War is enlightening.

In most years measles is responsible for a large enough proportion of the fatal cases of pneumonia in the Navy to demand thoughtful attention. The numbers of cases of measles vary considerably from year to year with varying prevalence in the United States at large. The disease is so prevalent in some years that the term "measles year" is not inapt. In other years comparatively few cases occur, and if these happen to be distributed for the most part in the warmer months no deaths may occur. Service factors which in great degree influence the prevalence and distribution of measles are high rate of personnel turnover with periods of active recruiting and corresponding increase in the size of drafts sent out from the training stations. It appears that while most sections of the United States in a given year have low death rates from measles or high rates, as the case may be, there are certain sections for which the rates do not correspond with those of most communities. For that reason, in a year that is not generally a measles year, considerable numbers of naval personnel may be exposed in some locality where the disease happens to be prevalent and then through transfers or movements of ships more or less spread in the Navy may take place. As a rule, however, prevalence in the Navy corresponds quite closely with prevalence estimated for the whole country.

With the passing of war-time conditions, the tendency of measles in the Navy seems to have been to follow a three-year cycle. The disease was unusually prevalent in 1920. In 1921 the incidence was quite low, and in 1922 remarkably low. Only one death occurred that year. This unusual freedom from measles was followed in 1923 by the highest admission rate experienced since 1918, which carried with it a death rate just about as high as the 1918 rate, which was associated with all the war-time epidemiological conditions.

The high prevalence in 1923 can not be explained as resulting principally from active recruiting and a high rate of personnel turnover, although the rate of turnover was considerably higher in that year than in either of the two preceding years. This, a measles year, was followed by a lower incidence in 1924 than has occurred in any recent year immediately following a year of high prevalence. Comparatively few cases have occurred this year so far as indicated by

figures available at this time. It remains to be seen whether a three-year cycle will bring high prevalence again in 1926.

Certain provisional death rates from measles for cities of the United States having populations of 100,000 or more, kindly furnished this office by the chief of the division of vital statistics, United States Bureau of the Census, are of interest. These figures seem to indicate low prevalence of measles in most parts of the United States in 1922 and high prevalence in 1923, corresponding with the Navy's experience. However, a few cities had higher death rates in 1922 than in 1923. These included New York; New Haven, Conn.; Fall River, Mass.; Jersey City; Trenton, N. J.; and Philadelphia, on the Atlantic seaboard. Inland cities which had lower rates in 1923 were Louisville, Ky.; Cleveland, Ohio; Cincinnati, Ohio; and Omaha, Nebr. The 1924 rates so far computed for cities of 100,000 population seem to indicate relatively low prevalence, corresponding again with the Navy's experience. Exceptions are Birmingham, Ala.; New Orleans, La.; and Trenton, N. J.

In view of the considerable importance of measles as a cause of death in the Navy from year to year, the monthly distributions of fatal cases of measles with case-fatality rates over a period of years are worth studying. Excluding the years 1917 and 1918, during which many factors besides intrinsic measles hazards may have and probably did influence epidemiological distributions and death rates, we have a period of 6 years for study—1919 to 1924, inclusive. Figures for 10 years might more safely serve as the basis for conclusions, but 6 years is a long enough period for the proper weighting of most unusual conditions.

The following table shows the percentage of measles cases which proved fatal for each month of the six-year period, and it indicates fatality probabilities:

Case fatality rates per 100, measles in the United States Navy, by months, 1919-1924, inclusive

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919.....	0	1.5	5.3	1.2	2.7	1.8	0	0	3.0	0	0	0
1920.....	8.6	3.3	1.3	0	0	0	0	0	0	0	.9	3.2
1921.....	2.6	2.4	0	0	0	0	0	0	0	0	0	0
1922.....	0	0	0	5.0	0	0	0	0	0	0	0	0
1923.....	1.4	4.2	1.9	1.2	0	0	0	0	0	0	0	.5
1924.....	3.2	0	0	0	0	0	0	0	0	0	0	0
Weighted averages, 6 years.....	2.8	3.0	2.2	.9	.5	.3	0	0	1.2	0	.4	1.9
Median rate, 6 years.....	2.0	2.0	.7	.6	0	0	0	0	0	0	0	0

The weighted averages, that is, mean case-fatality rates for the whole period of six years, by months, indicate a certain expectancy of fatal cases in September and November as well as in the colder

months. For most future years the expectancy is probably best indicated in the line showing monthly median case-fatality rates. These indicate that about 2 of 100 January and February cases will prove fatal, and less than 1 per cent of the March and April cases, after which a fatal case will rarely occur until the next winter.

It must be remembered that we are dealing only with adolescent and adult males in naval environments. During the past year, Dr. Edward S. Godfrey, director of the division of communicable diseases, New York State Department of Health, in the course of studying measles fatality rates in New York State, and after considering an article dealing with this disease in the United States Naval Medical Bulletin, discovered that the experience with measles in that State was quite different from the Navy's experience. He found that fatality rates were higher on the average in August and September; 1918 was an exceptional year and the highest fatality rate was for cases occurring in October, coincident with the pandemic of influenza.

The New York State figures show that median monthly case fatality rates for the five-year period 1919-1923, are as follows:

Median monthly case fatality-rate

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1919-1923.....	0.8	1.2	1.0	0.9	0.7	0.6	0.8	1.6	1.6	1.1	0.8	0.9

Most of the deaths were of children under 4 years of age. About 19 per cent of all measles cases and 73 per cent of the deaths usually occur among children less than 4 years old, and that probably accounts for the difference in the seasonal distribution of fatal cases. Children in institutions especially suffer very high fatality rates—at times as many as 30 per cent of those attacked die.

Children of preschool age probably account largely for summer epidemics and high death rates in August and September in other States as well as in New York, and very likely in the occasional year—1919 was the last one—in which deaths occur in the Navy in September, the cases might be traced, if epidemiological data were available, to foci of infection connected with outbreaks among young children, especially those of preschool age.

The following table is included to show the relations between deaths and numbers of cases which occurred each month in the Navy during the six-year period under discussion:

Admissions and deaths, measles in the United States Navy, by months and years, 1919-1924

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1919:													
Cases.....	152	135	169	162	75	56	35	64	68	79	53	30	1,078
Deaths.....	0	2	9	2	2	1	0	0	2	0	0	0	18
1920:													
Cases.....	128	90	231	114	159	168	101	99	82	62	117	343	1,694
Deaths.....	11	3	3	0	0	0	0	0	0	0	1	11	29
1921:													
Cases.....	302	165	110	44	33	29	28	11	0	10	7	6	745
Deaths.....	8	4	0	0	0	0	0	0	0	0	0	0	12
1922:													
Cases.....	3	5	8	20	22	7	7	5	1	8	4	57	142
Deaths.....	0	0	0	1	0	0	0	0	0	0	0	0	1
1923:													
Cases.....	279	379	104	85	78	98	74	50	11	13	82	185	1,438
Deaths.....	4	16	2	1	0	0	0	0	0	0	0	1	24
1924:													
Cases.....	187	48	25	16	16	13	22	11	3	0	1	5	347
Deaths.....	6	0	0	0	0	0	0	0	0	0	0	0	6
Total:													
Cases.....	1,051	822	647	441	383	371	267	240	165	167	264	626	5,444
Deaths.....	29	25	14	4	2	1	0	0	2	0	1	12	90

In 1923 measles was charged as the primary cause of 24 deaths. This figure represents 11.2 per cent of all deaths resulting from disease that year. In 1924 all the deaths resulted from January cases. It was not a measles year and there were only six deaths, but these are enough to show the need for surrounding measles patients, especially during winter months, with every possible protection.

This article is written with the hope that reminders from time to time may lead medical officers to give just that little additional forethought in planning for the transfer of measles patients and that extra care with precautions against cross infection by secondarily invading microorganisms that will save a life here and there.

It must not be assumed that unusual preventive measures are being advocated such as would interfere with the work of the naval organization or deprive officers and enlisted men of liberty who may have been in contact with a case of measles. As a matter of fact, it is believed that early detection of each new case and immediate isolation of the patient with careful bedside disinfection in conjunction with routine hygienic and sanitary measures, including sterilization of the crew's mess gear, which are expected to be in effect at all times in the Navy, will prevent the disease from spreading among naval personnel. Case-incidence figures for ships of the Navy indicate that when measles is discovered on board in a non-measles year the chances are about 2 to 1 that only a single case will occur. Among 33 ships which had measles introduced last year outbreaks occurred only in 6, and these were not extensive.

Most of the men infected were recruits. An immunity index of the crew, comprising men of older age groups as well as those in the groups 16-19 and 20-24, will usually show that a sufficient number have had measles to interpose effective barriers against progressive spread. Even in organizations composed mostly of recruits, surprisingly little spread takes place with efficient application of the measures mentioned above.

The estimate that the chances are about two to one that only the primary case or cases will occur when measles is introduced on board a cruising ship is based on experience in years in which measles is not generally prevalent. The experience in 1923 was different, and the epidemiological distributions indicated, so far as the experience of one year can be relied upon, that the chances in a measles year are about even that one or more secondary cases will occur from a primary case representing a focus of infection on board ship. In that year 78 ships of the Navy reported one or more cases of measles. Of these, 27 reported only one case during the entire year. The other 51 vessels did not all have outbreaks. The term "outbreak" is used here in an exaggerated sense to account for even a few cases if spread of the disease actually occurred or seemed to occur on board. Including the 27 vessels which had but a single case during the year there were in all among ships of the Navy 98 instances in which measles was introduced on board. The total number of such importations not followed by any spread, that is to say, where no secondary case occurred, was 47. In 36 instances more or less spread followed and an outbreak is considered to have occurred.

An outbreak for the purpose of this discussion is considered to have occurred if cases continued to develop in the third successive time period, the first period being considered as the one in which the primary case or cases developed. "Time period" may be defined as the maximum number of days elapsing between the appearance of one case and the time when a new case can no longer be attributed to a preceding case. Where primary cases were followed by a secondary case in the next time period, with no further development, the incident is not regarded as an outbreak. It so happened that in ships that had cases limited to two successive time periods only a single secondary case occurred in all but one instance where two secondary cases developed.

The 36 outbreaks, as defined, are listed below. Commas are used to separate cases which occurred in successive time periods. Dashes and a statement of the number of weeks elapsing are used to separate the figures when so much time intervened between cases that it is doubtful whether missed cases developed between recorded cases or whether a new importation of infection occurred, either to graft

more cases upon the existing outbreak or to start a new one. The epidemiological data submitted to the bureau are not sufficiently complete to justify a decision in every case. Very likely in some instances the medical officer on board ship could not decide, especially when liberty was being granted nearly every day and drafts of new men were being received frequently. However, this is not of any great importance because the object here is to show the worst that happened in every instance, and every doubtful case is considered as a part of the outbreak in question.

The following ships had altogether 36 outbreaks of measles in 1923 as indicated:

U. S. S. *Arizona*, 7, 10, 5, 4, 2, 0.

U. S. S. *Arkansas*, 1, 6, 6, 4, 0.

U. S. S. *California*, 4, 7, 2, 3, 1, 0. More than 20 maximum incubation periods intervened, followed by a fresh importation of infection with an outbreak as follows: 2, 1, 1, 1, 0.

U. S. S. *Delaware*, 1, 1, 5, 7, 4, 1, 0.

U. S. S. *Huron*, 1; five weeks, 1, 2, 0.

U. S. S. *Idaho*, 7, 4, 4, 1, 0.

U. S. S. *Maryland*, 1, 4, 1, 0. After a period of 20 weeks a second outbreak occurred: 1, 3, 2, 8, 0.

U. S. S. *Mississippi*, 16, 4, 1, 1, 2, 1, 0.

U. S. S. *Nevada*, 1, 2; six weeks, 1, 1; five weeks, 7, 1, 6, 2, 3; four weeks, 1, 0.

U. S. S. *New Mexico*, 5, 9, 5, 1, 0.

U. S. S. *New York*, 1, 11, 5, 3, 0.

U. S. S. *North Dakota*, 1; six weeks, 1, 2, 2, 5, 1, 1, 0.

U. S. S. *Oklahoma*, 2, 5, 6, 6, 2, 1, 0.

U. S. S. *Pennsylvania*, 1, 3, 5, 4, 1, 1, 1, 0.

U. S. S. *Pittsburgh*, 5, 5, 1, 1, 0; 27 weeks elapsed before another outbreak, 1, 1, 1, 0.

U. S. S. *Texas*, 12, 3, 7, 0.

U. S. S. *Utah*, 1, 2; six weeks, 1, 2, 2, 1, 0.

U. S. S. *Wyoming*, 2, 5, 11; five weeks, 1, 1, 0. After an interval of nine weeks a second outbreak occurred, 1, 4, 4, 0.

U. S. S. *Birmingham*, 1, 2, 1, 2, 1, 0.

U. S. S. *Charleston*, 2, 1, 1, 1, 0.

U. S. S. *Corry*, 1; six weeks, 5, 1, 0.

U. S. S. *Farenholt*, 1, 2, 1, 0.

U. S. S. *Hopkins*, 1, 1, 1, 0.

U. S. S. *Rappahannock*, 1, 2, 1, 0.

U. S. S. *Argonne*, 3, 2, 2, 0.

U. S. S. *Camden*, 2, 4, 7, 0.

U. S. S. *Canopus*, 1, 5, 1, 2, 0.

U. S. S. *Patoka*, 2, 1, 1, 0.

U. S. S. *Prometheus*, 1, 2, 1, 0.

U. S. S. *Relief*, 1, 1, 1, 2, 0.

U. S. S. *Rigel*, 1, 2, 1, 0.

U. S. S. *Vestal*, 3, 3, 1, 1, 0.

In view of the figures presented above, the experience with measles among forces afloat in 1923 may be expressed as follows, so far as the chance of spread from an introduced focus of infection is concerned:

The chances that no secondary case will occur from a primary case on board ship, 48 in 100.

The chances that one or more secondary cases will occur in the next succeeding time period, 52 in 100.

The chances that one or more cases will develop in the third successive time period, 87 in 100.

The chances that one or more cases will develop in the fourth successive time period, 26 in 100.

The chances that one or more cases will develop in the fifth successive time period, 11 in 100.

The chances that cases will occur after the fifth successive time period, 7 in 100.

In two outbreaks a single case occurred in the sixth successive time period and again in the seventh. One outbreak, that of the U. S. S. *Nevada*, extended over more than 12 time periods, but during the 26 weeks in which cases were occurring there was one period of six weeks in which no cases developed and another period of five weeks, so it is probable that measles was introduced repeatedly from outside sources of infection between March and September.

FUNCTIONAL NERVOUS DISORDERS AS OBSERVED IN INDUSTRIAL AND MERCANTILE ESTABLISHMENTS

The following, a paper given before the New England Health Institute at Portland, Me., by H. W. Stevens, M. D., Health Department, Jordan Marsh Co., Boston, Mass., is reprinted from the Commonwealth (Vol. 12, No. 2), the quarterly publication of the Massachusetts State Department of Health:

INTRODUCTION

In one of our Army hospitals in France a short time after the armistice there was a certain recent recruit, drawn, I believe, from some remote district of Alabama. As a hospital-train patient he had come down the line with the usual medical field card attached to his tunic so that the scarcely legible diagnosis could be seen by any of the medical personnel, and by the patient as well. The surgeon in charge of the ward on his next visit came upon this new dorky with his field card which showed a diagnosis often made when the field-hospital surgeon didn't know what else to say about a man who had failed to

make a good soldier—the diagnosis “Question of mental defect.” The ward surgeon, in his friendly manner, said: “Well, Sam, what’s the matter with you?” Sam was not a very sick looking ducky; nor did he feel very sick. He hadn’t very much to complain of; some one else had done most of the complaining. The best he could do was the dubious response: “Well, sar, I dun ‘xactly know, but dey says Ah’s got mental defeat.” His subsequent stay in hospital failed to reveal any more illuminating diagnosis than that he had already made for himself. But the fight in which this poor ducky had suffered defeat was of quite a different type from that of which the armistice marked the triumphant end. The essential cause of that ducky’s failure to weather the stresses of Army life and to become an effectual supporter of our Constitution is the substance of the theme I have undertaken to discuss.*

I am aware of some of the obvious dangers that lurk in the popular discussion of functional nervous disorders. A few weeks ago in Boston I met a physician who has medical supervision of the health of a big New England industry of about 20,000 workers. I had just come from New York, and I started to tell him with considerable enthusiasm of the full-time mental hygiene service in effect with the Metropolitan Life Insurance Co. and also with the Macy Brothers Co., a large New York store. This physician is one of the most sound, practical, and business-like physicians that I know engaged in industrial work, but I soon saw that he was not much in sympathy with my enthusiasm. His response was to the effect: “We have heard already too much about this mental hygiene business. It’s just encouraging people to be nervous. What we’ve got to do to cure these functional nervous people is to put the fear of God into them.” That is the opinion of one very good man. It has merits, only it seems to me to lack discrimination.

Appendicitis has doubtless been more “popular” in recent years. Since the recognition of that disease there have been many people who thought that they had it when they did not. Yet there is no doubt that fewer people have died or suffered the severer consequences of the disease since its true nature was recognized. So, there are those who believe that in functional nervous disorders—this great wastebasket of vague complaints and infirmities, that many practical physicians and surgeons discard as meaning nothing much at all—there is information worth the seeking for those who do not disdain a task of sorting and salvage.

NERVOUS SYSTEM

The term “nervous system,” as commonly used, designates those portions of our body supposed to be concerned with the experiences of consciousness and with the control and coordination of bodily activities. The most minute and discriminating anatomical division, however, of the parts of that “system” fail to find any structural counterpart of the manifold phases of consciousness and activity—subjective, objective, purposeful, automatic, appropriate; or uncoordinated and inappropriate. It is just this lack of knowledge that necessitates the makeshift we employ when we use the term “functional nervous disorders,” which implies that there’s nothing wrong only the nervous system just doesn’t work right.

SIGNIFICANCE OF “FUNCTIONAL”

The world has always been more interested—probably always will be more interested—in performance than in minute structure. To the uninitiated all disorders are “functional.” To most people an automobile is merely a *thing* that goes and transports us from place to place with more or less security and

comfort and with more or less of a sort of auxiliary sense of self-respect or pride. To most persons the failure of a car to go is due to some mysterious perversity, that puts its failure to perform, at least for that person, in the class of "functional." It is only the person with a knowledge of the mechanical elements of an automobile that can take the failure of your car out of the "functional" class and make of it a concrete problem of structure or adjustment. The identical principle holds for a more simple or a more complex mechanism. A wheelbarrow is less liable than an automobile to a "functional" disorder not because it is mechanical but because its mechanics are more easily and generally understood. The term "functional nervous disorder," then, is invented to designate disorders of thinking, or feeling, or behavior for which the most skilled mechanician of the living human creature—*anatomist, physiologist, psychologist*—have found no satisfactory explanation. That such disorders exist there is no doubt; that they are increasing in frequency there is cause to believe. We find them in government, we find them in business, in churches, and homes. They may be called queerness, *neurasthenia*; they may be called cleverness, brilliancy, art, or even extreme piety. They may be called dishonesty, trickery, treachery, politics, or crime. Sometimes they appear desirable, even admirable; under other guises, undesirable or reprehensible. I doubt if any one thing ever enjoyed or suffered such extremes of popular opinion, such a wide range of commendation or condemnation, as functional nervous disorder.

Indeed, if we limit strictly our ideas of orderly nervous functions to those that think, and feel, and perform in an entirely orderly, harmonious, appropriate, and consistent manner in the midst of all the multiplicity of relations of modern communities we may discover that all of us are touched in spots with some nervous disorder of the functional variety. I believe I am not pessimistic in expressing this view. A decidedly optimistic present-day philosopher, *Santayana*, says, "When we consider the situation of the human mind in nature, its limited plasticity, and few channels of communication with the outer world, we need not wonder that we grope for light or that we find incoherence and instability in human systems of ideas. The wonder rather is that we have done so well, that in the chaos of sensations and passions that fills the mind we have found any leisure for self-concentration and reflection and have succeeded in gathering even a light harvest of experience from our distracted labors. Our occasional madness is less wonderful than our occasional sanity."

INDUSTRY AND MERCHANDISING

Before undertaking the discussion of functional nervous disorders in relation to industrial and mercantile activities it may be well to survey the respective fields of industry and merchandising and to fix some of the landmarks, if there be any such, in those fields. It would require far more time than we want to spend here to make a comprehensive picture of production and merchandising and of the evolution of human relations represented by these two phases of our industrial system. We may, however, define some of the outstanding characteristics of those two processes or, rather, of those two phases of the same process. In perspective, industry as a whole may be regarded as the practical manifestation of the cooperative will and effort of numbers of individuals engaged in the creation of commodities from the raw material and the similar cooperating will and activity engaged in the distribution of those commodities among the ultimate users.

SALESMAN AND CRAFTSMAN

There is one conspicuous difference between the work of production and that of merchandising. The workman who operates a lathe, the farmer who sows the seed, cares for the growing crops, and reaps the harvest, is much closer to physical material in his daily activities and is to a greater degree subject to the laws that govern material things than is the worker whose job is selling merchandise. In the daily transactions of the salesman's job there is the ever-present temptation and the opportunity—even the encouragement—to make the worse appear the better reason. There is always the necessity for compromising with the unaccountable demands of the whimsical customer. The mechanic who runs his lathe or drill without oil, a workman who through carelessness or ignorance compromises with any of the fundamental laws of machinery or material, is very quickly confronted by the judgment of his own incompetence in the form of ruined machinery, spoiled material, or injury to his own person. Inherent in the salesman's job is the danger that the specious and the unstable may become a part of his daily practices. Inherent in the laborer's or the craftsman's job is a certain stabilizing influence, a kind of "straight and narrow way" laid down by uncompromising physical laws.

TYPES OF FUNCTIONAL NERVOUS DISORDER

The particular types of functional nervous disorder that concern industry are mainly of two sorts: First, the type that affects the will to create or work, which I suppose we must regard as the real motive power of industry; the second is that type that affects the cooperative aspect of industrial activities. The guises under which such disorders may masquerade seem almost infinite, but nearly all—at least as far as their special importance to industry is concerned—may be resolved into either one or the other, or a combination of both, which perhaps after all is but the equivalent of repeating the truism that creative effort in its cooperative expression is the very substance of industry.

"Disability" type of functional nervous disorder

In explanation of what I mean by the first type of functional disorder—that is, a disorder of the will to create—let me first discuss briefly the concept of "disability"—that impairment of the will to work when associated with some physical ailment or injury we call "physical disability." In other cases it may be due to some candidly recognized extraneous concern, such as home affairs.

In still other cases there may be no concrete factor to be found, either bodily physical condition or circumstances, to explain "disability." In these cases where disability is manifest in the guise of symptoms and complaints for which no basis can be found we have come to attribute disability to functional nervous disorder. People in this group suffer tortures of mind, and I have no doubt even of body from vague feelings that tell no clear story of disease to a trained and most observant physician, yet which have for the sufferer a significance that is ominous. These people tell much about "dullness," and "fullness," and "tightness," and "heaviness," and "drawing," and "sinking," and "all-gone feeling." I have tried my best to make a picture of that type of suffering, but the best I can make of it is a sort of nameless fear and dread. Apparently the feelings that are common and inevitable in all our bodies have in these poor people become distorted and exaggerated to the degree of threatening one of two things—physical incapacity or death. They tell you in a per-

fectly hopeless manner that their nerves are "shattered" or "completely gone" and they passively wait for that distant and uncertain time when they shall get back their "strength" or get "built up again."

Maladjustment type of functional nervous disorder

The representative of the second type—the type that interferes with the cooperative character of all enterprise that can be classed with industry—is the person who can not get along with other people, the person with some peculiar twist in his make-up that distorts or destroys the attitude of comradeship that normally springs up wherever two human creatures find themselves associated in almost any set of circumstances. The characteristic type of this class is the person who is incapable of the teamwork which is essential to any well-ordered industrial or mercantile undertaking. He is always looking to see that he gets what is coming to him, that no one puts anything over him; he misses utterly the idea expressed by Theodore Parker, who said, "The essence of democracy is not 'I'm as good as you are,' but, rather, 'You are as good as I am.'"

Personal history, salesgirl.—Within the past few months I have seen from time to time a girl of about 20 years who has been absent from her work since about the first of the year. She is a well-developed, rather pretty girl, apparently well poised, not at all nervous in appearance. But she tells at length and with considerable detail of her present troubles and of a period of practical helplessness when a child from what may have been "chorea" and of an almost miraculous cure at the hands of an osteopathic physician. The mother of the girl, too, tells with great detail the story of her own nervous breakdown as well as that of her daughter. The girl's chief complaint now is a feeling of "dullness" in the head which she cautiously admits is improving very gradually, but she really hasn't any idea when she'll be well enough to work. Incidentally, she is now under the care of the same physician who effected the cure of her childhood illness. Another fact of interest is that at her work in the store she is, or was, under the direction of a young man whom she considers distinctly her inferior intellectually and in breeding, and that annoyance figures in her story of her affliction. Weeks ago I had this girl examined by one of our best psychiatrists for evidence of definite nervous or mental disorder. He found none, but added in his report that she might be one of those superior individuals, made of a better grade of clay than the most of us, who will always find difficulties in mingling with the common earth of industrial and mercantile life. Meanwhile she still goes on to improve very gradually and cautiously, while I have the problem of what to do about a disabled absentee who is the picture of health and complacency.

Personal history, driver.—Several years ago I had as a patient a truck driver, 32 years old, whose right ankle was injured as a result of the bursting of a tire. The injury was apparently only a bruise. After 12 days, however, because pain persisted, special examination was made. The X rays showed a crack in one of the bones, with no displacement of the parts. The man was cared for by a casualty insurance company about five weeks. At the end of that time he was told his ankle was well and that he might go back to work.

After about a month back on his job he began to complain of weakness of the ankle felt while driving. He seemed to want a change of occupation although he wasn't able to make clear just what he wanted. There was no obvious reason why his ankle should be weak and no immediate move was made to change his job. One thought, I presume, that influenced me in my attitude was the fact that very frequently physical complaints are made the excuse for

a request for change of job. As time passed the man became more disgruntled and began to develop a complex set of mental reactions. He was inclined to make capital of the fact that his injury was at first considered less serious than it was in fact, although the treatment given at first was not essentially different from the treatment appropriate to the actual injury. He suggested that he might kill himself or some one else if kept on the truck and threw out the disconcerting threat that he would not feel responsible for any accident that might happen to his truck while driving. When he was finally put on another job—the most appropriate that could be found—he protested that this was as bad as the first and besides the pay was \$8 less on the new job, although in such cases any difference in pay is always made up and this man actually received the same amount of money on the new job.

First and last this man's problem occupied the time of numerous officials of the store and insurance company. It is possible that the number of persons concerned in trying to make an adjustment may have created another instance of too many cooks. The fact remains that a physical defect, which by all reasonable standards should have completely recovered within two or three months, became complicated by certain mental factors, chief among which was a feeling that he was the victim of some unjust treatment in the matter of jobs and pay. These mental factors which prolonged the period of partial disability to eight or nine months, at least, in the end came to overshadow almost completely the original physical impairment. The last I knew of this man was soon after he left the store because of dissatisfaction; he was working as a chauffeur for a private family.

Within a few weeks there have been in our health department two young men suffering from very peculiar complaints. One had a pain in the chest for which he could think of no explanation except "Perhaps my mother is sick." The other had nausea and vomiting—he thought because his wife was pregnant.

FUNCTIONAL NERVOUS DISORDER IN INDUSTRY

Any industry or store having a health service could multiply cases of actual disability with no discoverable physical defect, or of physical defect with associated disability exaggerated beyond all expectations based upon knowledge of physical defects alone. Also many an employment manager could supply a long list of problems in work adjustment or in discipline, all of which show some peculiar twist of personality as the real cause of failure as human units in industry.

Statistical discussion

I am going to give you now just a few figures to suggest the prevalence of these disorders which I have been trying to picture for you. As I know of no other source that provides the particular figures I want for my purpose I shall give you some figures drawn from a study which I, myself, have made.

In a group of store workers numbering about 4,000, in a six-month period from October to February, the diagnosis of functional nervous disorder was made 506 times. During the same period these disorders stand fourth in order of frequency among the complaints treated in the store health department. Of the total 4,000 workers 405 persons were affected in the six-month period. Thus about 10 per cent of all workers manifested disability from such complaints. During the same period 1,546 days of working time were lost by 123 individuals from this cause. This comprises something over 9 per cent of the total time lost through illness during this period.

We have no satisfactory means of estimating impairment of efficiency among those who suffered from nervous complaints and yet stayed on the job; and, furthermore, we can only guess at the loss from this cause complicating convalescence and prolonging absence from gross disease and injury. Not to be forgotten also are the drain upon potential human efficiency due to mental inferiority, and lack of moral stamina of workers' handicaps which seldom assume the form of complaints in a medical sense, and only occasionally come to the attention of the physician.

Finally an appraisal of the industrial value of those qualities of personality that make the difference between porter and president is largely a matter for speculation.

Discussion of remedies

I am aware that I am expected to face sooner or later the question, "What can be done about functional nervous disorder?" and I must admit at the start that we are far from any standard method or practice for universal application. But I suspect I may as well attempt that part of the task sooner or later.

Ignoring facts not a remedy

In the first place, I believe that saying "There's no such thing" or that functional nervous disorder is merely the creation of overzealous nerve specialists does not dispose of functional nervous disorder in industry or anywhere else. Any thoughtful observer has but to read current events and to look about him to see the evidence of disordered thinking and feelings manifested in the scrambled affairs of men (and women) in home, city, State, and Nation entirely outside as well as within the field of industry: Look into any court of domestic relations or the adventures of the eighteenth amendment; review the Sinclair oil episode with all its national and international complications; consider the tragic state of Russia's economic affairs. In short, consider any controversy in which human ideas of right and wrong are the issue.

Literature is full of dissertations upon this very theme containing at once a suggestion of the difficulty and the remedy.

Professor Carver in his "Religion Worth Having" says that people seem to think that vision or belief in anything regardless of its validity is a guaranty of the future for nations as well as individuals, and they quote "where there is no vision the people perish." He goes on to remark, "But also when there is a vision the people may perish—it is not recorded whether they perish more certainly in the one case than the other." Vision may be a mirage; belief, a delusion. The character of the vision and the belief is the factor which determines whether a people perish or survive.

Disordered thinking and feelings were the source of life's tragedies and failures long before the day of nerve specialists. It is still with us whether you say or do specifically little or much about it. Functional nervous disorders dissipate first or last a vast deal of life's potential energy without as well as within industrial occupations.

Fear not a remedy

Again, I certainly do not believe the solution is in ways and means of putting "The fear of God" into people—at least not in the common implication of that expression. It may work in a few cases, notably where malingering is the secret of the difficulty and in a few cases when it arouses a counter fighting mood. But generally people suffering from nerves are already too much the

victims of fear; in fact, their entire trouble is probably due to some haunting fear of one sort or another. One of the early records of failure to be productive resulting from fear is contained in the parable of the talents. "I knew that thou art a hard master, reaping where thou hadst not sown and gathering where thou hadst not strewn—and I was afraid and went and hid thy talent in the earth." With few exceptions I have not seen threats or unsympathetic severity accomplish any result except to make the problem of nerves more vexing.

Attacking the problem

I do believe that something can be done and that the approach to that something is in attacking the source of the difficulty by the most direct possible approach.

ESSENTIAL CHARACTERISTICS OF FUNCTIONAL NERVOUS DISORDER

The outstanding features of functional nervous disorder seem to arise from either an exaggerated morbid interpretation of bodily sensations or an exaggerated or morbid interpretation of circumstances and relations with other people. The unfortunate individual may be one who has lived a life of dodging obstacles; who has never had a vigorous red-blooded view of life. Always there appears to be some important fact or circumstance not squarely faced. The painful efforts of the individual to adjust the rest of his life to that important failure completes the unfortunate story of disordered nerves. The effects of disordered nerves may spread from one person to others; from the man of the house whose bad temper affects in turn the wife, children, the maid, and even the harmless necessary cat that lies under the kitchen stove; or from the manager all down through an organization. The sufferer if he has not the stamina to rise above and master his difficulty by sheer intellect and will is in a very true sense the victim of "mental defeat." The picture of the misguided pilgrim who turned aside from the hill path and whose journey came to an unhappy end in the wide field full of dark mountains is not too tragic for many a sufferer from disordered nerves.

The expressions of experience from widely scattered sources seem to agree that there is peril in any course except that which meets and deals with actual conditions and facts in an uncompromising decisive manner. Incidentally we gather that those who fail to follow such a course are more numerous than those who do. Compromise is often expedient, but compromise always means deferring the settlement of an issue to a time more or less remote from the present. Compromise is dangerous to integrity of mind. Evidently there is something in the slogan of mental hygiene that sound mental health means the "*ability to face actuality without compromise.*"

Practical measures

When we come to practical measures for any specific problem several viewpoints are possible. Whenever a bridge fails we may blame it on the load or on the bridge. When a particular set of nerves fails we may say the strain was too great; or the nerves were not equal to the strain. If it seems that the failure is due to too great strain we may say "fatigue"; if to nervous stamina not equal to what we consider average we say "nerves." The viewpoint, however, does not change the nature of the trouble; it only helps an onlooker to decide what's best to do about it.

Attention to the individual

If it appears that the trouble lies in the individual, it may be possible to help him fight his own battle by sympathetic insight into the nature of his difficulty (and sympathy that really helps must be intellectual as well as emotional). Some people have grown up from childhood as mollycoddles and spoiled children. Some have underlying physical impairments and defects aggravating their nervous symptoms. Eyes, or ears, or noses, or gastrointestinal functions may need attention. Some enthusiasts hope to find the source of functional nervous disease in glands of internal secretion. But that is something about which much is talked and little known. To help the individual whose sphere of thought, feeling, and activity is limited is relatively easy. To help the person of executive or administrative caliber is more difficult. Often the only remedy for nervous disorders manifesting themselves in unsound business policy is to wait for time to pronounce judgment in the practical fortune or success of the policy. In this relation it is interesting to note the headlines in a current newspaper, "Soviet acknowledges its failure in the field of industry." But always it is true that there are few people truly qualified to be the trustees of the inner secrets of other individuals.

Personal history.—Some months ago our visiting nurse sent in to see me a girl who was absent from work, and whom she thought should be sent to our rest house. The girl was pale and nervous and broken-spirited and certainly seemed in need of attention. There was nothing obviously wrong in her physical condition and I might easily have approved her going to the rest house on grounds of fatigue or nerves. But for some cause I was moved to look further, and after some questioning she proceeded to tell the whole story. She had been a member of a course of training for executives. She had hoped for months to fill a certain position after the completion of the course, but had been assigned to quite different work which was distasteful to her. She was discouraged and had quit. I am not sure how much influence my suggestion had. It is a fact, however, that something happened to this girl. She was intelligent, a college graduate; with pride and considerable moral stamina, and before she left my office she declared that she saw clearly just what the trouble was. She wasn't sick; she didn't need any rest house; she was going to come back and tackle her job and see the thing through, and she did.

Personal history.—A somewhat different type is a girl I saw only a few days ago. Numerous times before I had seen her and gone over pretty much the same story. On this particular day she rambled on as follows: "It's still nerves—every time I eat I feel so weak and trembly, and whether I eat or not I feel so—I work hard and try to forget it and I haven't a pain or an ache and I can sleep all right. On the cars I feel weak and I feel as though I'd like to ask some one for a seat, and after I get out I can walk all right—but I'm scared to go anywhere alone; it's those funny feelings I get." A very strange fact about this girl is that she loses little time and does her work well. Her solution of the problem of "nerves" is this—in her own words, "Mine doesn't show: mine works inside." Unfortunately too few cases of nerves can be trained to inside work.

Attention to environment

Often the sufferer from a nervous disorder is manifestly beaten by an environment that is too much for him. He may have struggled to the limit of his endurance and met defeat. Now, I do not regard it necessarily as a deficiency that a man or woman can not stand the pace of to-day's industrial life. Possibly the trouble may be a whole race of men suffering from nervous

disorder in the form of a frantic delusion that man's sole mission is to serve the cause of industry rather than industry to serve man. At all events sometimes the only solution seems to be the finding for the individual of a new manner of life that has less of complexity, less of conflict than the one in which his trouble has arisen.

Whenever viewpoint assigns the chief responsibility to circumstances, the problem seems simpler. At least it seems more concrete and tangible. The work of employment manager, personnel man, and physician in industry is a daily round of adjustments and readjustments, the removal of unreasonable annoyance of work or work circumstances, the untangling of impossible personnel relations.

In the extreme case the individual may be advised and assisted to find occupation in some other environment.

Personal history.—I recall one instance of this sort several years ago—a girl of about 20 years, intellectually, perhaps, a little below normal, but not conspicuously deficient.

Emotionally, however, this girl was utterly unable to cope with the stresses of store life. Repeatedly she was found in the health department, weeping copiously over some trivial jolt incident to her job that most persons would have passed over as all in the day's work. This girl was sent to one of our psychiatrists; then the situation was discussed with the employment manager, the mother, and the girl herself. It was found that arrangements could be made for the girl to work as a nursemaid to care for the children of a family in the country. This plan seemed nearly ideal. I saw her some weeks afterwards; she had gained about 10 pounds, had a rosy, healthy color—a very different creature—and I believe this was the first time I ever saw her when she was not in tears.

There is one suggestion that seems to me a possible avenue of promise in the distinction I made earlier between the work of the salesman and that of the craftsman and laborer. I believe that many a neurotic salesman or woman would find more appropriate and satisfying occupation in a machine shop, on a farm, or in a home where the personal relations would be less complex and the immediate environment of work would be simpler and nearer to the fundamentals, and for the same identical reason that a vacation in the mountains or at the seashore quiets jangled nerves and clears confused brains. It is a boon to highway traffic to have our bridges marked "load not to exceed 10 tons" or "25 tons" or "2 tons" or "cross at your own risk." A similar grading of nervous capacity as a basis for grading loads would seem a greater boon in industry and save many "nervous breakdowns" and "mental defeats."

Compromise

With a mind to a splendid, idealistic mental hygiene creed, as also a sympathetic mind toward the difficulties of industrial management, I must say a few words about "compromise." A rigid adherence to the creed that mental health means "facing actuality without compromise" would seem to leave little place in our scheme of things for concession and compromise and prescribe a rather hard-boiled business administrator. Compromise is not ideal and as a plan of individual conduct it leads at best to only commonplace achievement and at worst to most distressing complications. It does, however, seem in practice that "facing actuality" sometimes consists in candidly recognizing that a particular actuality is too great to be faced by a particular individual.

If compromise has a worthy place anywhere in human affairs, I would certainly grant it to the business executive or administrator for his task; it is to modify and adjust and mold conflicting ideas and feelings and interests of a corps of men and women into a productive organization. Also, while I can not speak with authority for organized mental hygiene, I am rather inclined to believe that its strictest exponents, confronted by some of the problems of a large business, would crave the privilege of compromising—just a little—with their uncompromising creed, and, I believe, grant the privilege of discerning sympathetic compromise as the only human means through which the business administrator can effect a happy adjustment of jobs to workers according to their several capacities.

EXTRACTS FROM THE ANNUAL SANITARY REPORT OF THE UNITED STATES NAVAL TRAINING STATION, HAMPTON ROADS, VA., FOR 1924

Information of epidemiological interest.—The principal epidemiological facts of interest are shown by comparison of Table 1 (not printed) with the similar table for the year 1923. It will be noted that the annual rate per 1,000 for all causes—721 per 1,000 as compared with 1,219 for 1923—was considerably less during 1924, and this is a very satisfactory decline both for diseases and injuries, the percentages of decline for each being practically the same. I am pleased to be able to report that as far as health conditions are concerned the past year has been very satisfactory.

Communicable diseases dropped from an annual admission rate of 362.25 per 1,000 to 290.64, and would have been much smaller had it not been for an epidemic of mumps which began early in the year and did not entirely disappear until the end of July. There were 313 admissions for mumps, which heads the list, with a rate of 97.29 per 1,000 as compared with only 43 admissions and a rate of 12.3 for the previous year. While 1923 may be called, in so far as communicable disease is a factor, a "measles year," 1924 may well be designated a "mumps year," and, of course, these diseases may reasonably be expected to appear on the station in epidemic form whenever they are prevalent in the city of Norfolk, as it is interesting to note that these diseases very seldom occurred in recruits while in detention, appearing after liberty had been granted. As previously reported, the general policy for the prevention of communicable diseases is to search out those sick and endeavor to make an early diagnosis with isolation while the disease is in its most contagious stage. The writer is strongly of the opinion that terminal disinfection is of little or no value to control the spread of communicable diseases.

Method of handling incoming recruits.—The training station is the kindergarten of the Navy. While this simile is true in a general sense, it is probable that few ordinary kindergartens produce

such marked changes in the individual as ordinarily occur in a naval training station. To those who are in daily contact with the recruit during the first few weeks of training, the frequent metamorphosis from the slouching, unkempt, and often undernourished farm boy to the erect, alert, healthy looking sailor is extremely interesting and gratifying.

Upon his arrival at the detention unit of the Hampton Roads Training Station, the recruit, after presenting his papers from the recruiting office, is taken to the incoming recruit office in unit "L," where the purposes and character of Navy insurance and allotments are explained to him and other routine paper work is transacted. He is also instructed as to the significance of Station Order No. 14, concerning the possession of other than regulation clothing by an enlisted man.

After having his hair cut by a station barber, he strips and takes a bath. His civilian clothing is either sent to his home (C. O. D.) or turned over to the Red Cross Society, as he may stipulate.

He is now ready for the physical examination by the medical and dental officers. These examinations are conducted twice a day, beginning at 8.30 a. m. and 1 p. m. During the cold months of the year, in order to prevent undue chilling, each recruit receives one suit of underwear prior to his examination. In the warm months this is dispensed with.

Immediately following the physical examination each man is vaccinated.

Having been passed by the medical officer and dentist the men proceed to the clothing room where they receive their full equipment and are ready to begin training.

In case a physical disability is found which would render a man ineligible for the service he is not equipped but is given "express room" clothing to wear until his case is decided by the "Board of Review," to which he is sent as soon as possible after his examination.

When a man arrives at the station too late in the day for the afternoon medical examination he is assigned a bed in the newly equipped incoming recruit bungalow, containing 36 beds, where he sleeps on the first night. This building is kept locked during the day and is opened after working hours in the late afternoon. A hospital corpsman is in charge and has orders to report to the medical officer any facts or suspicions which come to his notice relative to the undesirability for the service of men whom he has under observation (suspicions of drug addiction, sexual perversion, etc.).

As soon as a platoon of 54 men is formed the routine drills and lectures are begun. Lectures are given by the station chaplain, executive officer, paymaster, officer in charge of trade schools, and the medical officer.

During the three weeks detention the character of reaction following vaccination is recorded. Antityphoid inoculations are given at weekly intervals on Saturday afternoons and all men from Southern States are examined for hookworm or other intestinal parasites. During this period the men learn to sleep in hammocks in bungalows, each containing nine men, and receive daily instruction in seamanship, manual of arms, drilling, Navy nomenclature, compass reading, etc.

The recreation room, which is now being renovated, is large enough to accommodate the entire unit personnel. In this building the chaplain has an office in which is an ample library. In the evenings boxing bouts are frequently held upon the stage at one end of the main room and motion pictures are shown four times a week.

A small canteen furnishes ice cream, cake, soft drinks, confectionery, tobacco, etc.

About two-thirds of the men gain from 8 to 10 pounds in weight during their training period (8 weeks), which speaks well for the character of the food and the life in general.

In spite of the enforced restriction to the unit, happiness and contentment are universal. The recruit is kept too busy for the time to hang heavily and when taps are sounded he is usually tired enough to sleep soundly and well.

With a view to improving the medical side of recruiting and lessening the number of recruits found to have mental and physical disqualifications the Bureau of Medicine and Surgery early in October ordered a medical officer to this station for duty at the Recruiters' School and as a member of the Board of Review.

All men passing through the Recruiters' School have been given lectures and demonstrations at the recruit examining room, emphasizing the undesirable features encountered in prospective applicants for enlistment.

Two medical officers prior to going on recruiting duty have been ordered here and have received instructions with special reference to defects found in recruits received from the various recruiting stations.

Group mental tests have been given to recruits, and the work is now so organized that a psychological test will be given to each recruit received at the station. It is believed that data resulting from these examinations will be of great service to the officers concerned with training and discipline.

In connection with the undesirable recruit whose inaptitude is established shortly after arrival at the training station and whose discharge is recommended by the Board of Review, it is strongly recommended that each case be made the subject of a letter to the medical recruiting officer, pointing out the nature of the defect and

suggesting measures by which such cases could be eliminated in the future. Such a procedure would have the advantage of conveying to the officer concerned immediate knowledge of the case and would enable him to take steps to prevent a recurrence. At present information relative to men disqualified at training stations only reaches the recruiting medical officer long after the man is discharged, and then in an indirect manner.

As color blindness seems to be one of the most common defects coming before the Board of Review, it is suggested that the Stillings test be furnished each recruiting office, as it is undoubtedly a material adjunct to the various tests now used for color blindness. If the use of the Stillings test at recruiting stations caused only a limited reduction in the number of color-blind cases now received at training stations, the amount saved would be sufficient to offset the cost of supplying the tests.

Listed below is a recapitulation of hookworm examinations during the year.

State	Total cases examined	Hook-worm positive	Per cent
Alabama.....	292	111	38
Florida.....	290	107	37
Georgia.....	445	124	28
Oklahoma.....	4	1	25
North Carolina.....	448	106	24
Mississippi.....	50	11	22
South Carolina.....	206	48	23
Arkansas.....	116	11	9.5
Tennessee.....	186	16	8.6
West Virginia.....	150	11	7.3
Texas.....	14	1	7
Virginia.....	237	15	6.3
Missouri.....	21	1	4.8
District of Columbia.....	75	2	2.7
Maryland.....	235	3	1.3
Louisiana.....	8	1	12.5
Kentucky.....	170	17	10
Arizona.....	2	0	0
Total.....	2,949	586	19.9

Treatment of the sick.—Treatment of the sick becomes necessary when prevention of disease fails. With the conditions under which men live as carefully controlled as modern knowledge and military discipline can devise, men yet become sick and must be cared for until returned to duty or otherwise disposed of.

A sick man is not fit to perform his full duty. The share of responsibility that is his in the military organization of which he is an integral unit is weakened in proportion to his disability, and the whole organization suffers just so much thereby. The larger the organization and the smaller his responsibility the less his dropping out is felt, but he is missed somewhere along the line and his loss appreciated. He may be, moreover, a menace to the health of his

fellows and must be isolated, lest his disease affect the whole organization. It becomes imperative that he be treated and returned to duty at the earliest possible moment or his place filled by another. To replace a man fully equipped and trained requires considerable time, money, and effort. In time of great national emergency no replacement may be had.

With these fundamentals in mind the medical department of this station has attempted to so care for the sick that each man incapacitated for any reason whatsoever is returned to duty as soon as modern therapeutic and surgical means can effect this end, or is otherwise disposed of. To obtain the earliest possible contact with the sick well-equipped dispensaries in charge of medical officers are maintained in each of the three units where recruits are made to undergo their training and in the trade schools. There are four such dispensaries where sick call is held twice daily.

The minor surgical injuries, such as cuts and sprains, and the lesser medical complaints, such as coughs and colds, are given first aid here. If the disability is of sufficient importance, the individuals are sent to the central station, called sick quarters, for such hospitalization as may be deemed necessary. At this central station a complete bungalow-type hospital is maintained, where the patient is carefully studied and treated. No major surgery is attempted at the present time here, due to the nearness of the naval hospital, Norfolk, Va. The policy followed is to give adequate first aid to the injured; to splint fractures, controlled by X ray; and, further, transfer the patient to the naval hospital at Norfolk, Va. Acute abdominal cases are cared for in the wards, which are manned by hospital corpsmen. Severe cases, such as pneumonia, acute infectious diseases, malignant malaria, or mental cases, are not held for treatment in the wards unless there is some unusual indication, but are transferred to the hospital at Norfolk. An isolation ward is well equipped and held ready for any epidemic of acute infectious diseases. A well-equipped operating room for eye, ear, nose, and throat work is maintained here, and much excellent work is done in the matter of treatment and operation. Both naval personnel and their families receive the benefits of this department. The genito-urinary diseases are treated almost altogether at sick quarters; only occasionally is a patient transferred to the hospital at Norfolk, when it is felt that he will be several weeks on the sick list. For this reason any new cases of syphilis discovered or syphilitics in need of hospital treatment are transferred. A thorough examination of all recruits received at the training station is given. Treatment is given at once for intestinal parasites and continued until all tests are negative.

The dispensaries are maintained for the earliest possible contact with the sick among the enlisted personnel on the training station. There is provided, in addition, a medical officer whose duty it is to attend service families and naval personnel living outside the units or in Norfolk. This duty has developed into a highly important one and is of great value in saving sick days for men taken ill at home and in promoting their contentment, because of the splendid family care provided. Obstetrical cases are cared for by this medical officer in the civilian hospitals. It is not felt incumbent upon him to attend such cases unless they consent to go to a hospital. The same condition applies to major operations. A dispensary fitted out as an office is also maintained at sick quarters for the treatment of families and such naval personnel as is not cared for at sick quarters. The medical officer having this duty is in attendance in the mornings. It is felt that a female nurse is needed here, but so far none has been provided.

The science of medicine tends eventually to the prevention of diseases, but until the ideal is reached and man sickens not and dies only of old age men will continue to grow ill and must be cared for with all the skill and sympathy that can be brought to their aid.

After viewing Colonel Vedder's plant at Edgewood and getting advice from him, a chlorine plant was assembled and put in operation here. This was not as easy as it might seem and was made possible only by the courteous assistance of other departments. As it now stands, we believe we have as fine an apparatus as any in the country. We can keep an accurate control on the concentration of gas in our treatment room. This seems to be the most important thing in giving this treatment. The concentration is kept between 0.012 and 0.015. This is checked by chemical analysis every 15 or 20 minutes.

A short description of the apparatus may not be out of place. Two rooms in the operating pavilion were set aside, one as a treatment room and the other for the machinery. The gas comes from a large tank through a large bottle valve, thence through a flow meter into the intake pipe. This leads into the upper part of the treatment room. By the use of baffles the incoming chlorine-laden air is disturbed. The exhaust is taken off from the lower part of the room with a 16-inch fan run by a half-horsepower motor. The air is tested by running 50 liters through potassium-iodide solution and titrating with a hundredth normal sodium thiosulphate solution. Our treatment room will hold 12 patients and receives about 1,400 cubic feet of air per minute.

During the time treatments have been given about 150 patients have passed through. Of these only 8 have reported no improve-

ment. Three of these were chronic cases of bronchitis or catarrh, who only came for one treatment, and of course in these cases no results can be hoped for under three to six treatments. About 50 per cent of the patients came but once, so it makes it very hard to give any accurate statistics. Our cases have been far too few to be able to form any opinion as to real value of the treatment. It has improved a number of the acute coryza, acute bronchitis, chronic bronchitis, ethmoiditis, and sinusitis cases. In the few acute laryngitis cases it has promptly cured the aphonia, but did not seem to touch the laryngeal inflammation. The above is simply a summary of our impressions. Later on, when we have had a great many more cases, more definite conclusions will be formed.

**COMMENT BY THE FLEET SURGEON, UNITED STATES ASIATIC FLEET,
REGARDING CONDITIONS AFFECTING INCIDENCE OF THE VENEREAL
DISEASES IN THAT FLEET**

Commander James A. Randall, Medical Corps, United States Navy, Fleet Surgeon of the United States Asiatic Fleet, in the annual sanitary report of the fleet for 1924, discussed conditions making for high venereal disease exposure rates among personnel attached to ships on the Asiatic Station as follows:

Venereal disease remains the greatest factor of increase in the sick report. Were it not for these diseases the statistics would show this as one of the healthiest stations of the Navy. The venereal-disease rate shows an increase over last year. This is accounted for by the fact that the Fleet remained in China from two to three months longer than usual on account of the political situation, and also by the fact that some of the destroyers went to India, Burma, and Siam. These showed very high rates after the visit. The venereal-disease rate increases during the stay in China and drops during the stay in Manila. There are several factors which cause this condition. In the first place venereal infection is not so prevalent ashore in the Philippines as in China. The natives are more cleanly and have a better idea of hygiene. Secondly, the crews of the ships are busy with target practice while in Manila and do not get so much liberty. Thirdly, the men have more forms of amusement in Manila, especially athletics, which keep them from frequenting the dives. The two main places of venereal infection are Shanghai and Chefoo. There are any number of prostitutes of all nationalities in Shanghai and they are largely infected. As the Fleet spends about two months of the year in this port, the venereal-disease toll is high.

In Chefoo numerous houses of prostitution are licensed during the stay of the Fleet. These are all Chinese, but the cabarets and dance halls are frequented by Russian women of a low class. No all-night liberty is granted in Chefoo, but all of these places are in full swing during the day.

The river gunboats are usually stationed in small places where there are no forms of amusement for the men and consequently their venereal-disease rate is high.

There are two great factors which cause the high rate on this station. The first is the lack of wholesome feminine companionship which men of the

age of our sailors naturally desire. There are no girls of their class and nationality with whom they may go, so they naturally gravitate to the prostitutes and dance-hall girls.

The second, and perhaps the greatest actual reason for venereal infection, is the fact that intoxicating liquor is plentiful and cheap. A man who, in his sober state would not expose himself to the well-known danger of infection, when intoxicated loses his ordinary judgment and falls into the hands of women of the lowest class. In addition, intoxication renders him unable to properly protect himself and take effective prophylaxis after exposure.

We can not curtail the sale of liquor ashore or control the prostitutes. The only thing left for us to do is to furnish wholesome amusement for the men and thus keep them away from evil influences as much as possible. To this end the Navy Y. M. C. A. in Shanghai is doing a splendid work. The men are encouraged to use the beautiful building which has been erected in Shanghai, and they give various forms of amusement, such as dances and moving-picture shows for the men. The Navy Y. M. C. A. has also established a branch in Chefoo, which gives an entertainment of some kind every evening and furnishes a place which men use to a great extent. In this connection it is well to mention that the foreign citizens of Chefoo have shown great interest during the past year in the enlisted men of the Fleet, and have been instrumental in getting up shows and dances for them as well as turning over a number of tennis courts for their use.

Constant instruction is given to the men in sex hygiene and venereal prophylaxis, and the system of double prophylaxis as instituted last year is still in force.

NOTE.—A census of persons in the Navy known to be infected with venereal disease on June 1, 1925, indicates that 9.7 per cent of the total personnel of the United States Asiatic Fleet had syphilis the day the census was taken, and 6.5 per cent had gonorrhea. About 2.5 per cent had chancroidal infection. So far as enlisted men are concerned, percentages were as follows:

	Known to have syphilis, June 1, 1925	Known to have gonor- rhea, June 1, 1925
	<i>Per cent</i>	<i>Per cent</i>
Chief petty officers (white).....	11.5	1.4
Enlisted men of lower ratings:		
White.....	11.0	7.9
Filipino.....	4.8	0.8
Negro.....	7.7	7.7
Chinese.....	2.8	0
Enlisted men of the Marine Corps:		
Staff, gunnery, and first sergeants.....	0	0
Enlisted men of lower ratings.....	3.4	9.5

Data for the entire Navy will be published in a forthcoming number of the BULLETIN.

HEALTH DEPARTMENT OF DETROIT REDUCES PERIOD OF ISOLATION FOR SCARLET FEVER

The Department of Health, city of Detroit, has recently changed its regulations regarding the period of isolation for cases of scarlet fever with such complications as running noses, ears, and sinuses.

In the past, such cases have been held in hospital for 56 days from the beginning of the period of isolation, and for cases treated at home, 42 days, unless the complication had cleared up before that time. In the future all complicated cases of scarlet fever, whether treated at home or in hospital, will be held in strict isolation for 35 days.

Epidemiological observations extending over a period of 15 months showed that complicated cases held in isolation at home from 28 to 42 days gave rise to secondary cases in about 4 per cent of the cases so isolated, compared with 7.46 per cent of hospital cases detained for the longer period, 56 days. Feeling that in all probability the percentage of secondary cases would not be increased by shortening the isolation period, the department amended its regulations. This information was obtained from the Weekly Health Review, published by the Department of Health for the week ended May 2, 1925.

STATISTICS RELATIVE TO MENTAL AND PHYSICAL QUALIFICATIONS OF RECRUITS

The following tables were constructed with figures taken from monthly reports submitted by Boards of Review at naval training stations:

Cumulative data for January 1 to July 31, 1925

	Number	Per cent of recruits received	Per cent of recruits reviewed
<i>All Naval Training Stations.</i>			
Recruits received during the month.....	6,053		
Recruits appearing before board of review.....	384	6.34	
Recruits recommended for inaptitude discharge.....	289	4.77	75.26
DATA FOR THE MONTH OF JULY, 1925			
<i>United States Naval Training Station, Hampton Roads, Va.</i>			
Recruits received during the month.....	21		
Recruits appearing before board of review.....	6	28.57	
Recruits recommended for inaptitude discharge.....	6	28.57	100.00
<i>United States Naval Training Station, Great Lakes, Ill.</i>			
Recruits received during the month.....	33		
Recruits appearing before board of review.....	4	12.12	
Recruits recommended for inaptitude discharge.....	1	3.03	25.00
<i>United States Naval Training Station, San Diego, Calif.</i>			
Recruits received during the month.....	67		
Recruits appearing before board of review.....	30	44.78	
Recruits recommended for inaptitude discharge.....	22	32.84	73.33
<i>United States Naval Training Station, Newport, R. I.</i>			
Recruits received during the month.....	43		
Recruits appearing before board of review.....	7	16.28	
Recruits recommended for inaptitude discharge.....	7	16.28	100.00

ADMISSIONS FOR INJURIES AND POISONING, MAY, 1925

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during May, 1925, is based upon reports reaching the bureau prior to August 10, 1925:

	Admis- sions, May, 1925	Admis- sion rate per 100,000 per annum, May, 1925	Admis- sion rate per 100,000, year 1924
INJURIES			
Connected with work or drill.....	314	3,282	3,148
Occurring within command, but not associated with work.....	167	1,746	1,705
Incurred on leave or liberty, or while absent without leave.....	85	880	1,004
All injuries.....	566	5,917	5,857
POISONING			
Industrial poisoning.....	1	10	21
Occurring within command, but not connected with work.....	38	397	128
Associated with leave, liberty, or absence without leave.....	2	21	25
Poisoning, all forms.....	41	428	175
Total, injuries and poisoning.....	607	6,345	6,032

PERCENTAGE RELATIONSHIPS

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave, liberty, or A. W. O. L.	
	May, 1925	Year 1924	May, 1925	Year 1924	May, 1925	Year 1924
Per cent of all injuries.....	55.5	53.7	29.5	29.1	15.0	17.2
Per cent of poisonings.....	2.4	12.1	92.7	73.4	4.9	14.5
Per cent of total admissions, injury, and poisoning titles.....	51.9	52.5	33.8	30.4	14.3	17.1

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title, "Drug addiction," or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases selected from morbidity reports for the month of May, 1925, are worthy of notice from the standpoint of accident prevention:

Unguarded opening in the deck of a turret.—The plate covering the hole in question had been removed. A man inspecting the turret fell through the opening and received a lacerated wound of the leg, which kept him on the sick list eight days.

Improperly secured hatch cover.—A pin was missing. While a man was climbing up the hatch ladder, the cover fell on his leg. Contusions required two days' treatment on the sick list. The acci-

dent was reported as resulting from negligence on the part of other persons.

Faulty scaffold line.—A man on a scaffold was painting a smoke-stack, when a line, later found to be old and defective, parted. The victim fell to the deck but escaped with no more serious injury than a sprained ankle. He was disabled 25 days.

Inadequate illumination.—A man at a naval air station, while on his way to the head at night, ran into a locker which he could not see and fractured his nose. The injury involved 10 sick days.

Unsafe practice.—A man turned on the oil in a fire box before putting in a "kindling blaze." He had been warned against this practice. A flareback caused burns of the face and forearms which required 10 days' treatment on the sick list.

Improperly secured stage line.—A man was working on a stage over the side of a destroyer in drydock. One of the lines was not properly secured. He fell about 20 feet into the dock, receiving multiple contusions which disabled him for 12 days.

Absence of usual safety device on a milling machine.—One of the operator's sleeves caught in the machine and his arm was drawn into the cogs. A compound fracture resulted which required treatment for 115 days in hospital.

Loose floor plate in a fireroom.—A floor plate, which was loose as a result of the negligence of some other person, caused a man to slip. He fell and sustained a lacerated wound of the leg.

Gasoline; unsafe practice.—A man was cleaning a motor with gasoline. He failed to disconnect the battery. A spark ignited the gasoline. Burns of the face and arms required treatment for 34 days in hospital.

Lack of eye protection.—While working at an emery wheel a piece of emery or metal lodged in an eye causing a wound of the cornea, disabling the man for 11 days. The report stated, "No goggles furnished."

Almost every month the accidental injury reports reaching the bureau include one or more relating to unusual or peculiar injuries. The May reports included the case of a boy who had been led by reading detective stories to believe that lye would eradicate scars. He tried to remove a scar from his arm by this method and incurred a severe chemical burn which disabled him for 54 days.

HEALTH OF THE NAVY

This report is for the month of September. The monthly summary of health conditions among forces afloat is based upon morbidity reports for the month received from ships before the 15th day of the following month. September reports were received from 96 per cent of all vessels comprising the Battle Fleet and from 73 per cent of those composing the Scouting Fleet. These reports indicate average conditions with respect to the incidence of acute respiratory diseases. There were comparatively few admissions for any of the communicable diseases.

Reports from naval stations in the United States likewise indicated the continuance of summer conditions.

The following table shows provisional admission rates per 1,000 per annum, entire Navy, for the principal communicable diseases for July, 1925, together with corresponding median rates for the same month, 1920 to 1924, inclusive:

	July, 1920-1924	July, 1925
Cerebrospinal fever.....	0	0
Diphtheria.....	0.75	0.11
German measles.....	1.08	.53
Influenza.....	11.21	21.15
Malaria.....	14.02	8.44
Measles.....	2.16	.21
Mumps.....	10.76	6.19
Pneumonia.....	2.33	1.60
Scarlet fever.....	.63	.11
Smallpox.....	0	0
Tuberculosis.....	2.69	.85
Typhoid fever.....	.10	.11

TABLE NO. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the month of June, 1925*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	75,964	38,815	19,772	114,779
All causes:				
Number of admissions.....	2,878	1,863	871	4,741
Annual rate per 1,000.....	454.64	575.96	528.62	495.67
Disease only:				
Number of admissions.....	2,423	1,578	742	4,001
Annual rate per 1,000.....	382.76	487.85	450.33	418.30
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	589	413	190	1,002
Annual rate per 1,000.....	93.05	127.68	115.32	94.76
Venereal diseases:				
Number of admissions.....	801	280	157	1,081
Annual rate per 1,000.....	126.53	86.56	95.28	113.02
Injuries:				
Number of admissions.....	449	282	129	731
Annual rate per 1,000.....	70.93	87.18	78.29	76.43
Poisoning:				
Number of admissions.....	6	3	3	9
Annual rate per 1,000.....	0.95	0.83	1.82	0.94

TABLE NO. 2.—*Summary of morbidity in the United States Navy and Marine Corps for the month of July, 1925*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	74,339	38,013	19,152	112,352
All causes:				
Number of admissions.....	2,912	1,928	865	4,840
Annual rate per 1,000.....	470.07	608.63	541.98	516.95
Disease only:				
Number of admissions.....	2,529	1,656	741	4,185
Annual rate per 1,000.....	408.24	522.77	464.29	446.90
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	656	418	170	1,074
Annual rate per 1,000.....	106.89	131.96	106.52	114.70
Venereal diseases:				
Number of admissions.....	926	321	180	1,247
Annual rate per 1,000.....	149.48	101.33	112.78	133.19
Injuries:				
Number of admissions.....	378	267	122	645
Annual rate per 1,000.....	61.02	84.29	76.44	68.89
Poisoning:				
Number of admissions.....	5	5	4	10
Annual rate per 1,000.....	0.81	1.58	2.51	1.07

TABLE NO. 3.—*Death reports, entire navy, for the month of August, 1925*

	Navy (strength, 94,003)	Marine Corps (strength, 19,308)	Total (strength, 113,311)
Pneumonia, lobar.....	1	0	1
Tuberculosis, chronic pulmonary.....	1	0	1
Tuberculosis, other forms.....	1	0	1
Malignant growths.....	1	0	1
Other diseases.....	3	1	4
Drowning.....	4	0	4
Other accidents and injuries.....	6	2	8
Total.....	17	3	20
Annual death rate per 1,000, all causes.....	2.17	1.86	2.13
Annual death rate per 1,000, disease only.....	.89	.62	.86

TABLE NO. 4.—*Death reports, entire navy, for the month of September, 1925*

	Navy (strength, 93,200)	Marine Corps (strength, 19,152)	Total (strength, 112,352)
Pneumonia, broncho.....	1	0	1
Scarlet fever.....	1	0	1
Tuberculosis, chronic, pulmonary.....	1	1	2
Malignant growths.....	1	0	1
Other diseases.....	8	0	8
Drowning.....	11	0	11
Other accidents and injuries.....	18	0	18
Total.....	41	1	42
Annual death rate per 1,000, all causes.....	5.28	.63	4.49
Annual death rate per 1,000, disease only.....	1.55	.63	1.30

¹ Five of the deaths from drowning were connected with the loss of the U. S. S. *S-51*, Sept. 25, 1925. Death certificates for other members of the crew who were lost have not been received in the bureau.

² Fourteen of the deaths from accidental injuries were caused by the loss of the dirigible balloon *Shenandoah* Sept. 3, 1925.



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PREFACE

The UNITED STATES NAVAL MEDICAL BULLETIN was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officers, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the BULLETIN of distinct originality and special merit, the Surgeon General of the Navy will send a letter of commendation to authors of papers of outstanding merit and will recommend that copies of such letters be made a part of the official records of the officers concerned.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. STITT,
Surgeon General United States Navy.

NOTICE TO SERVICE CONTRIBUTORS

Contributions to the **BULLETIN** should be typewritten, *double spaced*, on plain paper, and should have wide margins. Fasteners which will not tear the paper when removed should be used. Nothing should be written in the manuscript which is not intended for publication. For example, addresses, dates, etc., not a part of the article, require deletion by the editor. The **BULLETIN** endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble, and unnecessary changes in manuscript can be obviated, if authors will follow in these particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The **BULLETIN** intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc.* All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.

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SPECIAL ARTICLES

THE UNITED STATES PUBLIC HEALTH SERVICE IN WAR TIME

By A. M. STIMSON, Assistant Surgeon General, United States Public Health Service

At the request of the officer in charge of the Division of Planning and Publications, Bureau of Medicine and Surgery, Navy Department, the following personal observations and opinions are contributed to the discussion of the general subject of the organization of the Government services for maximum efficiency in time of war. They are based on an experience of 23 years in the Public Health Service, affording opportunity to estimate which of its activities in peace time would be no less important during war; and on a detail of 21 months as sanitation officer of the second naval district during the World War, which presented one important phase of military duty.

The views herein expressed are entirely personal and unofficial. Moreover, they are by no means so crystallized that they might not be modified after discussion. Opportunities for such discussion, however, have been few, and it is only hoped that this article may lead to some profitable consideration on the subject.

The Public Health Service does a great many things in peace times which it would be a mistake to discontinue during war. In fact, some of them should be intensified in the interest of maintaining the health of both the military and civilian populations. Some of these will be alluded to later on, but here it is desired to emphasize the opinion that if a diversion of personnel to military duty in war time is contemplated, it should not be carried to the extent of crippling some vital functions which the Public Health Service is qualified to perform.

The outbreak of the Great War found the personnel of the Public Health Service, like all good Americans, eager to take its part in the struggle. The natural impulses of red-blooded men in times like this is to leave their vocations, seize what weapons are at hand, and rush to the scene of conflict as our ancestors did of old, and it is probable that this impulse was felt in as great a proportion of the Public Health Service personnel as in any class of the general population. In the confusion of the earliest days a few officers succeeded in getting their resignations through and joining the Army

or the Navy, but it soon became evident that the primitive conditions of colonial days had been superseded by those of elaborately organized government, and that the individual must fit into the general scheme of things, whatever his personal predilections might be. Resignations were rigidly refused and officers were instructed to carry on until directed to undertake duties more intimately connected with the prosecution of the war. Some twenty-odd officers found themselves already in as close association with military activities as heart could desire. As medical officers in the Coast Guard, which automatically became a part of the Navy, they shared the discomforts, hardships, and dangers of active duty in the area of active naval operations. Others, already stationed in Europe, became sufficiently familiar in the course of their official duties with the hostile activities to feel with justice that they were doing their part in the war. But the great majority of the personnel, at the quarantine and immigration stations, in the hospitals, in the laboratories, and in the field research and demonstration activities, must have felt with chagrin during those early weeks that here in the greatest crisis of history they were being passed by unutilized, even forbidden to do what patriotism urged. In many cases this feeling was unjustified since their present duties were as important as any others which they could have performed.

But wise heads had been at work in planning for these individuals. Minds which saw things in the large, which realized how many different activities go toward winning a war, had been busy in developing schemes for placing the individual where he could do the most good. On April 3, 1917, the President, under authority granted by Congress, proclaimed the Public Health Service a part of the military forces of the United States. This proclamation held out a certain hope to all members of the corps that, although their services might not be employed in just the manner which their impulses and imaginations might devise, they were nevertheless being considered as eligible and useful for war purposes.

The plan gradually emerged, orders were issued, and the personnel fell into line in what must still be regarded in the light of all our subsequent experience as a very creditable scheme of organized effort. In general, the officers and other employees were made to feel that the work to which they were assigned was vitally associated with the successful conduct of the war; and while many may have envied the man at the gun, they could no longer complain that they were doing nothing in the world crisis.

The ramifications of the scheme of service were so numerous that it would be impossible to detail them here, but the outstanding contributions of effort may perhaps best be grouped under the following heads: Furnishing medical officers to the Coast Guard, furnishing

medical officers trained in sanitation and disease prevention to the office of the Surgeon General of the Navy and to each of the naval districts, establishing a system of extra Army cantonment sanitation, establishing a nation-wide antivenereal campaign, furnishing hospital facilities to Army and Navy personnel, safeguarding the serums and vaccines used by the military forces and engaging in researches for their better production and control, and, finally, engaging in laboratory researches in connection with explosives and lethal gases.

The present writer had no personal experience with these activities except that pertaining to the furnishing of sanitation officers to the Navy. He acted as sanitation officer in one of the naval districts from July, 1917, to March, 1919, during which time he collected a variety of experience, which from the standpoints of professional interest, of pleasant personal relationships, of humorous and of pathetic incident marks this as one of the most interesting periods of his life and tempts him strongly toward detailed and probably tedious reminiscence. This personal feature, however, must be dismissed with the statement that although exposed to no greater hardships than taking trips to outlying islands in ice-covered "converted" 50 footers, and no greater dangers than inspecting fulminate plants which sometimes blew up, and dodging "reported" but probably mythical submarines, and with no outstanding service to his credit, he did receive the termination of his detail with regret, and with the feeling that if he had not been useful he had at least been active during the war.

The association on duty of two different branches of the Government service is always a situation of some delicacy, and especially so when both are characterized by a well-marked *esprit de corps*. Such difficulties as do arise, however, are traceable chiefly to some laxity of definition of respective powers and authorities, or to a faulty interpretation of instructions in this respect. In the association between the Navy and Public Health Service under discussion the agreement between the departments and bureaus at Washington was definite, the orders were explicit, and any little misunderstandings which arose were easily settled by reference to the written word. The Public Health Service officers were detailed to the Navy Department, and under orders from the Secretary of the Navy were assigned to duty under the Bureau of Medicine and Surgery. Two were assigned to the office of the Surgeon General and one was assigned to duty in the office of the medical aide of each naval district. These officers were subject to the orders of the commandant of the district in all matters pertaining to the administration and discipline of the district. Their duties were purely advisory, but were far from having that flabby and impotent character which is frequently associated with the phrase "advisory capacity." Their

potency arose from two circumstances; first, that these officers were authorized to visit and inspect every station in the district, and, second, that they were directed to report their observations and recommendations on the health and sanitary status of the stations to the Bureau of Medicine and Surgery. These reports were, of course, transmitted through the medical aide and the commandant, who were privileged to make such comment as they desired in their indorsements.

It might well be thought that this arrangement would be distasteful to the naval officers, and especially the medical officers on duty at these stations. In ordinary times it would undoubtedly be so. The medical officers of the Navy are well trained and competent in all professional matters pertaining to their duties, including the preventive and sanitary methods used in the maintenance of the health of personnel. They would resent with justice any interference from an outside corps in the internal management of their stations. But it is a matter of record that the entrance of this country into the war put the matter in an entirely different light. There was an unprecedented expansion in personnel and equipment of all kinds, emergency situations arose almost daily, and the regular officers were simply numerically inadequate to the new problems. The reserve officers called to duty soon outnumbered the regular officers by several or even many to one. In the observation of the writer they were in general fully competent professionally to care for sick and injured men. Indeed, many of them represented the highest type of specialists which could be obtained from civil practice. But there were relatively few whose training and experience qualified them to inaugurate and maintain measures calculated to prevent the occurrence of sickness and disability among the personnel. Few had ever been called upon to prevent disease in even a small group of men, and now they found themselves responsible for the health of hundreds or thousands, and that, too, under conditions of rapid expansion of forces under emergencies.

Most of the naval stations, both old and newly established, were near or even within civilian communities from which in many cases supplies were derived, and to whatever health hazards there existed the naval personnel was more or less exposed. For example, the water and milk supply of the station was often that of the civil community, and the personnel when on liberty walked the streets, visited the theaters, and otherwise had abundant opportunity to acquire whatever communicable diseases might be prevalent in town.

In consideration of the foregoing circumstances it may well appear that the medical aide at least, upon whom the responsibility for the health of the personnel in the district centered, might welcome the presence at his elbow of a trained sanitarian experienced

in the methods of disease prevention in large groups of persons and accustomed to dealing with civilian health authorities, and upon whom he could depend for reliable and impartial information. It is believed that in as far as the Public Health Service officers answered these specifications they were welcome and useful in the districts. However, it is for the Navy to evaluate these services.

The question arises as to whether it is desirable to contemplate the repetition of this arrangement in case of another war, and, if so, what modifications, if any, are indicated, and if not, what substitute plan should be adopted. It can confidently be predicted that the need for some provision will become immediately apparent in case of another war. Inasmuch as the naval medical personnel was reinforced in this instance by only a dozen or so officers, it might be assumed that a proportional increase in the regular naval Medical Corps would settle the matter. The writer is not disposed to question the feasibility of this plan nor to discuss it further than to suggest that some advantage may have arisen in the past crisis from the very fact of the somewhat detached attitude of the Public Health Service officers, and also from their average greater familiarity with dealings with civilian health officials and a possibly more direct and uncensored reporting to headquarters. As another proposition, there may be considered the plan of including in the reserve Medical Corps a number of skilled civilian sanitarians, who could be called to active duty as sanitation officers in time of war. This calls to mind the consideration that in time of war it is almost as essential to maintain the health of the civilian communities from which recruits come and to which the military personnel may be exposed as it is to care for that personnel on the military stations. Any considerable depletion of the skilled civilian health forces in the States and communities would therefore be undesirable. Moreover the lack of familiarity with service conditions and procedure would undoubtedly retard their efforts in the beginning.

The foregoing paragraph introduces the subject of extra cantonment sanitation, a war-time activity of the Public Health Service which in this service is looked upon in retrospect with considerable satisfaction. It had long been an established policy in the Public Health Service to encourage the permanent establishment of adequate local health activities all over the country by all available authorized means. This is an undertaking of great magnitude which is still far from complete accomplishment. While it is gratifying to observe the steady increase in the proportion of communities having adequate local health service, the number still unprovided is great, and by far the greater part of them have as yet failed to adopt this concrete application of the gospel of public health. Owing to this existing policy of the Public Health Service and the activities

which were already under way it was both natural and easy to plan and carry out an intensified program of this sort in those communities near which the great Army cantonments were situated. It was realized that no matter how carefully the health of the recruit under training was safeguarded within the reservation, the moment he left that jurisdiction he would become exposed to whatever unhealthful influences might exist outside. It was therefore planned to accomplish in every practicable way the sanitation of the zones immediately surrounding the cantonments, and the first step in this direction was to see that this area was or became provided with an adequate official health service. This was arranged by cooperation with the State, county, and municipal authorities geographically concerned. The arrangement typically consisted of the assignment of Public Health Service medical officers and other personnel skilled in the organization and operation of health units to assist in the rapid building up of an effective local health service, to which the local authorities contributed a great share of the personnel and funds. Under the stimulus of war conditions this work was greatly facilitated. That would have indeed been both an unpatriotic and an unintelligent community which would have failed of response to the call at this time, in view not only of the need of safeguarding the health of the soldiers but of the advantages to the community resulting from making the conditions therein attractive and wholesome. These plans were in general successful not only in their immediate purpose but went far as demonstrations to implant the desire for permanently bettered health conditions in the community.

The relations with the Army in this matter were to a great extent informal, but, since there could be no question either of authority or of interest, strictly official relations were soon replaced by the friendliest personal cooperation.

The antivenereal campaign has perhaps been sufficiently written up elsewhere so that no extended reference to it is essential here. It is well known that under the authority of Congress and with a generous appropriation for the purpose a successful attempt was made to bring about a frank discussion of the venereal peril on all sides and to put into operation on a nation-wide scale a program calculated to diminish that hazard as it affected both the military and civilian populations. The results as they affected the military forces have been variously evaluated by different observers, but there is little room for discussion concerning the statement that whereas before this program was put into effect venereal diseases were not discussed in polite circles they are now the subject of frank and intelligent consideration anywhere and may now receive as unobstructed public attention as may typhoid fever or measles. This in itself is a great accomplishment, because when an unpleasant situa-

tion is robbed of the cover of obscurity and mystery under which it has been allowed to multiply its offensiveness its ultimate eradication becomes assured. Agencies for the early and effective treatment of the diseased and for the control of diseased prostitutes have multiplied throughout the land, and to say that the country as a whole is several million dollars' worth better off than before is to make a statement which will hardly be challenged.

The remaining war-time activities of the Public Health Service which were enumerated at the beginning of the article hardly require more than the briefest reference here. The personnel of the Army and of the Navy are at all times beneficiaries at need of the marine hospitals operated by the Public Health Service, and in war time it is only necessary to request the extension of hospital facilities in order to secure them to the available limit. The control of serums and vaccines and of the salvarsans sold in interstate or international trade is placed by law under the Treasury Department and is based upon inspections and tests made by the Public Health Service. During the war this service became greatly expanded, not only on account of the enormously increased production and use of these products but because new diseases demanded new products which could only be prepared and controlled as the result of painstaking researches. The continued satisfactory performance of this function may be said to depend alone on adequate appropriations. During the war some of the expert chemists and physiologists of the Service laboratories served with credit on joint boards for studying explosives and lethal gases employed in warfare. In any time of national emergency the services of experts in any of the many branches of natural science with which the Public Health Service has to deal, and who are numbered among the personnel of that Service, would, of course, be made available to any Government agency concerned with the national defense.

In the opinion of the writer the war-time activities of the Public Health Service, as above outlined, approached an ideally effective arrangement. The vital activities of the Service were not crippled; they were rather extended and intensified, while the assignments to duty with the Navy were in the capacities calculated to be of most usefulness.

There are but a few suggestions to be added. In any interservice arrangement the exact status of the detailed officers should be perfectly understood at the departments and bureaus concerned, and the language of the details should make this status so clear that no subordinate can be puzzled by it. Personally I had no difficulty worth mentioning from this source, although once or twice some delay occurred while orders were being interpreted and explained.

Another matter concerns the question of relative rank. Things go smoother in military services if the rank of officers from other services is established on a comprehensible and comparable basis. Wearing a non-Navy uniform with a gold leaf, it was natural that I should be addressed as "Major," which was complimentary, but inaccurate, and occasioned many questions which became rather wearying as time went on. The strange uniform also caused some delays on visiting new stations while papers were being examined and the officer of the day consulted. It would be better for these and other reasons, I think, to have detailed officers appointed as acting naval medical officers, to wear the Navy uniform and with rank corresponding to the running mate in the Navy as determined by the period of commissioned service. If this could be done without sacrificing the commissions in the Public Health Service or prejudicing the return of the officers after a fixed period (or after the conclusion of war), many small misunderstandings would be averted.

A TWO YEARS' STUDY OF DYSENTERY IN HAITI

By P. F. DICKENS, Lieutenant, Medical Corps, United States Navy

Upon reporting for duty in the Gendarmerie d'Haiti, I was informed by Lieut. Commander Micajah Boland, Medical Corps, United States Navy, medical director of the gendarmerie, that dysentery among the prisoners was one of the most serious problems with which he had to deal. The statistical data of the prisons showed that bacillary dysentery was the cause of more admissions to the sick list than any other disease and that the case mortality was more than 40 per cent. Dysentery was the one disease in which treatment seemed of no avail. The mortality was especially high in the larger prisons of the Republic, where those awaiting the action of the courts were confined. It was known that the physical condition of the floating population of the prisons was far below that of the prisoners who had been confined for more than six months. It was decided to institute an investigation of dysentery in the prisons and if possible to determine the following:

- (a) Types of dysentery present.
- (b) The prevalence of dysentery.
- (c) The quickest and best way of establishing a diagnosis.
- (d) The class of prisoners infected, mode of transmission, methods of preventing the spread of dysentery, case mortality.
- (e) Most effective method of treatment. It was especially desired to establish, if possible, a routine method of treatment, which would be efficacious, especially for those districts and prisons to which no medical officer was attached and where the treatment would have to

be administered by a native male nurse. Particular attention was to be given to the efficacy of antidyenteric serum, in cases of bacillary dysentery.

The investigation was confined to certain prisons in the Department of the South and at Port au Prince, where dysentery was then epidemic. During March and April, 1923, the writer visited these prisons and gendarmerie stations, made a careful survey of the prisoners, and recorded all the cases of dysentery then under treatment. A survey of the water and food supply, with methods of handling both, was made. Several trips into the interior were made to ascertain the living condition of the natives and to get a "close up" of the rural Haitian in his home environment.

(A) TYPES OF DYSENTERY PRESENT

Fortunately, we were saved much valuable time and laboratory work in determining the type of dysentery present by the work of Bennett at the Haitian General Hospital (Naval Medical Bulletin, March, 1923, p. 389 et seq.); indeed, our investigation could be said to begin where Bennett's work ended. This worker made a total of 3,048 examinations of dysentery cases. He examined specimens from widely scattered sections of the country. The bacteriological work consisted of plate cultures from stools, drop cultures, subcultures, agglutinations, autopsies, histological sections, animal inoculations, and 1,140 microscopical studies of specimens obtained from stools. He recovered an organism which gave the cultural characteristics and serological reactions of the Shiga type of *Bacillus dysenteriae*. When injected into a vein of a rabbit this organism produced a paralysis of the hind quarters, sphincter paralysis, and a bloody, mucoid colitis. The organism was again isolated from the rabbit's colon. In addition to the above work, early in 1923 Bennett made cultures from cases of our series and isolated an organism identical with that isolated from his own series.

A prior tentative diagnosis of bacillary dysentery by a microscopical study of the exudate had been made in these cases. Of the efficacy of the diagnosis of bacillary dysentery by a cytological study more will be said later. We fed five guinea pigs at various intervals on muco-pus from the stools of dysenteric patients; the results were identical and as follows:

Date	Guinea pig (number)	Mucoid stool (days)	Paralysis of the hindquarters	Result
May 4, 1923.....	1	2	Fifth day.....	Death sixth day.
July 18, 1923.....	2	3	Fourth day.....	Death seventh day.
Sept. 10, 1923.....	3	3	Sixth day.....	Death sixth day.
Sept. 24, 1923.....	4	2do.....	Death seventh day.
Oct. 3, 1923.....	5	3	Fifth day.....	Do.

From the above the conclusion is reached that the principal infective agent in Haiti is the *B. dysenteriae* (Shiga type).

Profiting by this preliminary work, the medical director ordered sufficient antidysenteric serum (Mulford's polyvalent) for the investigation of the efficacy of this form of treatment, and at the same time a well-equipped laboratory for the gendarmerie was established.

B. PREVALENCE OF DYSENTERY

Prison statistics show that there were 567 admissions, with 5,731 sick days and 142 deaths during the fiscal years 1923 and 1924; this gives an average period in the hospital of 10 days per patient, but does not represent the total period of incapacity, for the patient is unable to do manual labor for a period of 10 days or two weeks longer. The case mortality was 25 per cent. The statistics of the Service d'Hygiene show that there were 2,023 deaths in the civil population due to dysentery for the same two-year period. The number of admissions is not reported. Using the same case mortality of 25 per cent, there would be 8,092 cases of dysentery during this two-year period, or more than 4,000 per year occurring in the civil communities of Haiti. Allowing 15 days incapacity per case, there would be an industrial loss of 60,000 days annually. In this connection it is desired to quote the medical director's report for the month of November, 1923:

Dysentery: There were 48 admissions for bacillary dysentery, with 24 deaths, giving a case mortality of 50 per cent. Of all deaths during the month, 52.17 per cent were due to this disease. In regard to this disease in the Tropics, MacGregor says: "Dysentery is a destructive giant compared to which strong drink is a mere phantom." Eldridge, in 1899, reports a case mortality of 21 per cent among 125,989 cases. Shiga, in Japan, reports a case mortality varying from 22 per cent to 55 per cent. Anders, in his fourteenth edition, page 68, states, of acute tropical dysentery, "The prognosis is almost wholly unfavorable." Castellani and Chalmers, second edition, state: "The death rate in severe acute dysentery is high and * * * in other tropical countries dysentery is a more potent factor in the death rate than malaria." They also state, "According to Kruse, Shiga, Duval, Dopfer, and our own experience, early serum treatment lessens the mortality considerably and therefore improves the prognosis." Stitt, fourth edition, gives a case mortality of from 20 to 40 per cent. All of these authorities base their statistics on the general population. It is a well-known fact that institutional morbidity and mortality rates are higher than it is among the civil or general population. Bahr treated 53 consecutive cases with a case mortality of 13.2 per cent. He treated a second series of 106 cases, using a polyvalent serum in addition to salines, with a case mortality of 1.8 per cent. Bahr highly recommends the use of the polyvalent serum in the treatment of this disease. Serum has been used in a very limited number of cases among the prisoners, its unlimited use being prevented by lack of funds, the cost per case being about \$7.50. Where it has been used the results have been very gratifying.

At the beginning of this investigation it was found that no one would admit having had dysentery, but would admit having had "Cholerine." This is a local term used to designate diarrhea with pain in the belly, regardless of cause. Another term, "Bisquettee Tombee," was encountered. This is used to designate the supposed separation of the ensiform cartilage and its falling into the stomach. This term covers any condition of pain in the upper abdomen and has been found a very prominent prodrome of dysentery. Most of our cases presented themselves at sick call with "Bisquettee Tombee" prior to the advent of "Cholerine." The writer is of the opinion that dysentery probably takes a greater toll of life among the young, the old, and the debilitated of Haiti than any other disease, and it is believed that statistics support this conclusion. In a population estimated at from 2,000,000 to 2,500,000 to have 2,023 deaths reported is fairly conclusive evidence that dysentery is of great economic importance. Bacillary dysentery is endemic in Haiti and at times severe epidemics occur.

(C) DIAGNOSIS

The diagnosis of bacillary dysentery requires a careful physical examination of the patient, and care in this respect is essential; therefore we are obliged to place first on the list "a careful physical examination," as other diseases prevalent here may be accompanied by the passage of bloody, mucous stools with tenismus and tormina. Amebic dysentery, tuberculous colitis, syphilis of the rectum, and the dysenteric type of intestinal malaria may all confuse the diagnosis. The Wassermann reaction is not of as much differential diagnostic value here as elsewhere, since a high percentage of the population (about 60 per cent) shows positive serum tests for syphilis. Amebic colitis is comparatively rare in Haiti, which made our diagnostic problem less difficult. It occurs occasionally and histolytica cysts are often found. One case of amebic dysentery occurred in this series. At the beginning of this investigation the only laboratory equipped to do the necessary bacteriological work was the central laboratory of the Service d'Hygiene, which was already overtaxed. It was therefore impracticable to attempt to culture all cases. This was true of cases occurring outside of Port au Prince, since in many it would take from 3 to 8 days to get specimens to the laboratory. In view of the laboratory work which had just been finished by Bennett it was not thought to be necessary, as the *B. dysenteriae* (Shiga) had been established as the causative agent. At this time the gendarmerie established its own laboratory, and it was decided to make a microscopical examination of fresh and stained smears of all cases. In the first cases of this series a previous microscopic

examination of the exudate was made and a tentative diagnosis of bacillary dysentery established, which diagnosis was later confirmed by cultural study.

All these cases had the following clinical symptoms, given in the order of diagnostic value:

- (a) Diarrhea with marked abdominal pain following stools.
- (b) Stools of muco-sanguinolent, sero-sanguinolent, muco-pus character; one case giving a slough of mucosa.
- (c) Toxemia and exhaustion.
- (d) Diarrhea, continuing after action of initial purge with no change in character of stool.
- (e) Elevation of temperature from 101° to 103°.
- (f) Rapid emaciation.

The cytological picture of the muco-pus of the stool was typical for bacillary dysentery in all cases. The above symptoms, with a typical microscopical picture, were required in order to establish the diagnosis of bacillary dysentery. It is believed that by adhering to so rigid a scheme we may have passed over some cases, but for the main purpose of the investigation, which was to test the efficacy of the serum and other accepted methods of treatment, it is perhaps best that we did.

Microscopical examination of the exudate.—We made 970 microscopical examinations of unstained and stained smears from the mucopurulent portion of the stools and believe that this is the quickest and one of the best methods of confirming a clinical diagnosis of acute bacillary dysentery in field work. We found it of advantage to stain with Gram's stain in addition to making a study of the fresh preparation and smears stained by Leishman's and other stains. The finding of a typical picture, plus Gram negative, intracellular bacilli was taken as additional evidence of bacillary dysentery.

The cell content of the exudate is typical in all cases of bacillary origin. The microscopic field is covered with leucocytes, some so swollen that the protoplasm can with difficulty be made out. These swollen cells form the so-called "Ghost Cells." In addition there are found endothelial cells, some vacuolated, which may be mistaken for ameba. There are only a few red cells. With a microscopical picture showing a preponderance of pus cells with few red cells in a case which is clinically dysentery, we now feel fairly confident in diagnosing such a case as bacillary dysentery by this method, which is quick, easy, and fairly accurate. We taught our native hospital corpsmen to make a thin smear from the mucopurulent portion of stools and forward it to the laboratory for examination. In this connection it is desired to quote from Fletcher and Jepps (Studies

from the Institute for Medical Research, Kuala Lumpur, Federated Malay States, No. 19, 1924) : "The characteristic exudate of bacillary dysentery consists almost entirely of plump pus cells, with perhaps the addition of a few scattered blood corpuscles. We made a preliminary inquiry into the value of a diagnosis by this cytological method in the year 1920, and with that object, examined 88 persons who were suffering from dysentery. The result was that in 69 of the cases the provisional diagnosis, made from the microscopical examination of the stool, was subsequently confirmed by further investigation. * * * We concluded that in early acute dysentery a correct diagnosis can be made in almost every case by a simple microscopic examination, and that this method promises to be most useful as a guide to treatment in hospitals and elsewhere, for it is obviously impracticable to examine every case bacteriologically." These authors further state that "A single microscopical examination is of more use as a guide to treatment than a single cultural examination." The diagnosis is, then, established if you have a diarrhea which persists after the action of the initial purge with the stools of mucosanguineous or serosanguineous character, toxemia, elevation of temperature, and a typical microscopical picture as described.

The cytological diagnosis of bacillary dysentery is covered more in detail by the following authors: Anderson, *Lancet*, II, 1921, pages 998-1002; Haughwout, *Bulletin* No. 3, 1924, Federated Malay States Institute for Medical Research; Willmon and Sherman, *Lancet*, II, 1918, pages 200-206; and Fletcher and Jepps (1924), quoted above.

(D) (1) CLASS OF PRISONERS INFECTED; (2) MODE OF TRANSMISSION; (3) METHOD OF PREVENTING THE SPREAD OF DYSENTERY IN THE PRISONS

Before one can understand the conditions prevailing in the prisons in Haiti it is necessary to explain that our prisons serve a threefold function:

1. Incarceration of sentenced prisoners.
2. Incarceration of individuals awaiting trial by courts.
3. Incarceration of the insane.

In our investigation we found that dysentery occurred first among the nondescript type of vagabonds awaiting trial (73 per cent of cases). Second, among the insane (16 per cent of the cases), and 11 per cent from among the sentenced prisoners. During the two-year period under discussion there were handled in the prisons 68,534 prisoners, thus giving a fairly accurate cross section of the population of Haiti. The average weight on admission of males confined in the National Penitentiary at Port au Prince was 117 pounds. The average weight of the male prisoners confined for more than six months was 142 pounds, thus showing that dysentery

does not gain much headway among those who are healthy. Those awaiting trial and the insane are not quartered with the sentenced prisoners, nor do they eat at the same time as the sentenced prisoners; they do not handle the food, and the only contact is within the courtyard after work and when visiting the latrine. It was found that daily disinfection of the latrine seats, segregation of the new arrivals, and the prevention of any free intercourse with the sentenced prisoners prevented the spread of dysentery to the main section of the prison. All cells were scrubbed daily with a lysol solution and only healthy prisoners allowed to work in the mess halls or kitchen. In this manner dysentery was eradicated from the National Penitentiary and now we have only a few cases from those recently admitted. Immediately upon finding a case of dysentery the patient is admitted to the prison hospital and isolated from the other prisoners and patients; he has his own urinal and bedpan, and, when allowed up, is quartered in the isolation cell for a period of two weeks. All bedding and wearing apparel are disinfected. The only one who could spread dysentery would be the old chronic case or carrier.

Modes of transmission.—From the statistics dysentery in Haiti follows the rainy season or, more correctly speaking, is a dry-season disease. This is contrary to most published accounts of the seasonal occurrence of the disease; but if one takes into account the habits of the natives, it can readily be seen why this is so. To one who is familiar with the primitive habits of the natives the mode of transmission seems obvious. In the dry seasons the small streams become practically nothing but very small water courses; the natives use these streams for washing their clothing; they defecate along them and use them for obtaining water for drinking and bathing. Many natives will be using a single stream at a trail crossing; one may see them obtaining drinking water just below the point where others are washing their clothing and persons. It is a familiar sight to see one stop washing her clothes, cup her hands, and get water to drink; also one may see the natives drinking water from open sewers in Port au Prince. The water during the dry season is nothing more than sewage. This same scene will be found on the streams at every trail crossing. The incidence of dysentery to rainfall is clearly shown by the accompanying charts. (Figs. 1, 2, 3, and 4.) With the advent of the rainy season the small streams, confined as they are between the mountains, become raging torrents; the natives can not use them for bathing purposes nor for washing clothes, and the sewage is more diluted and is quickly and frequently washed away; therefore the incidence of dysentery falls very low. The second mode of transmission is from food which is placed for sale on trays and boards alongside the streets and roads and is handled by every-

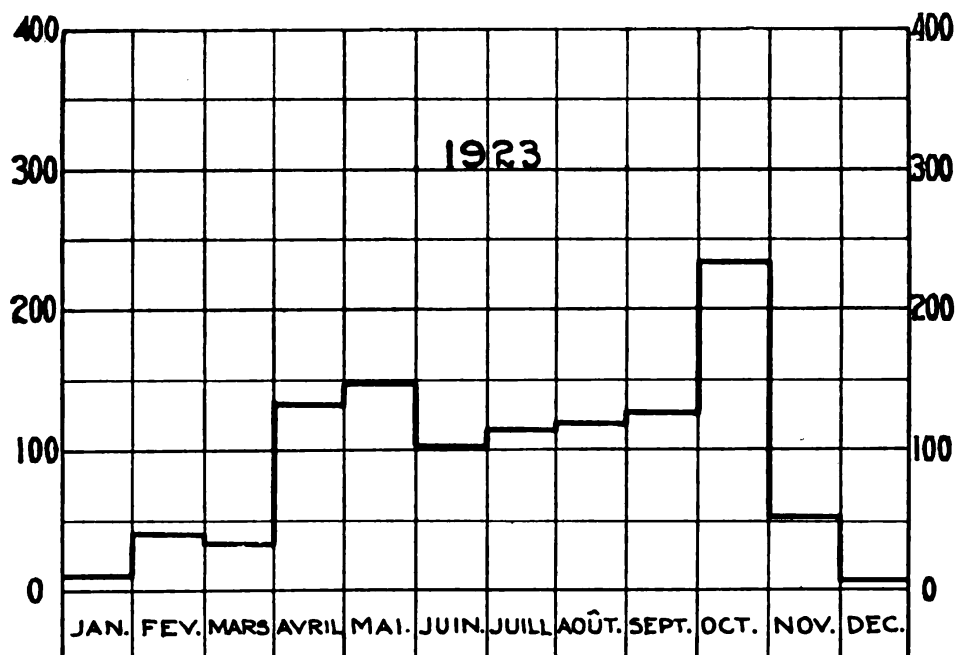


FIG. 1—Rainfall in millimeters for each month of the year 1923, for the stations investigated. Compare with Figure 2

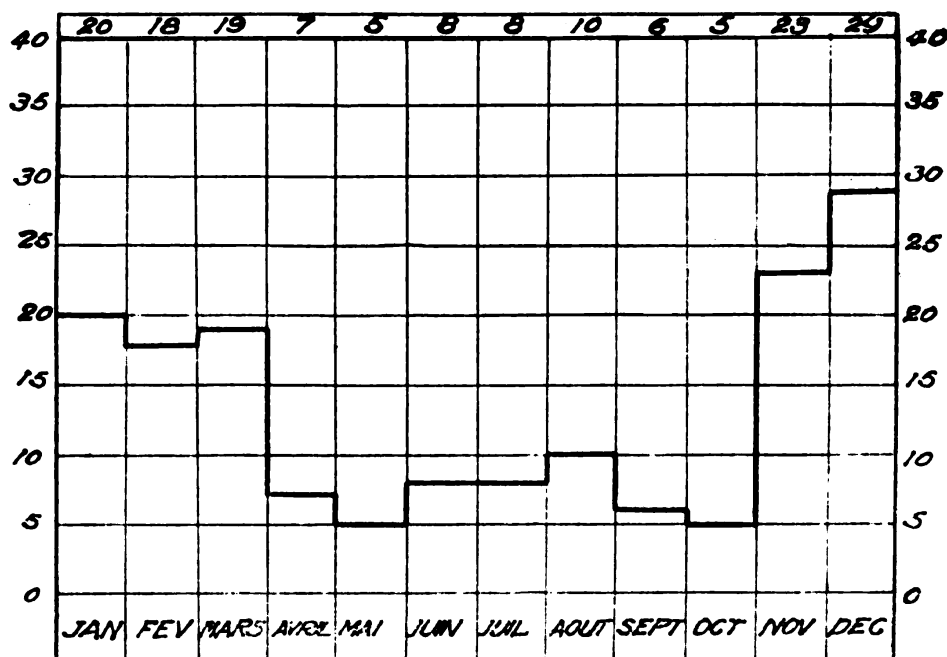


FIG. 2—Number of cases of dysentery admitted each month of the year 1923

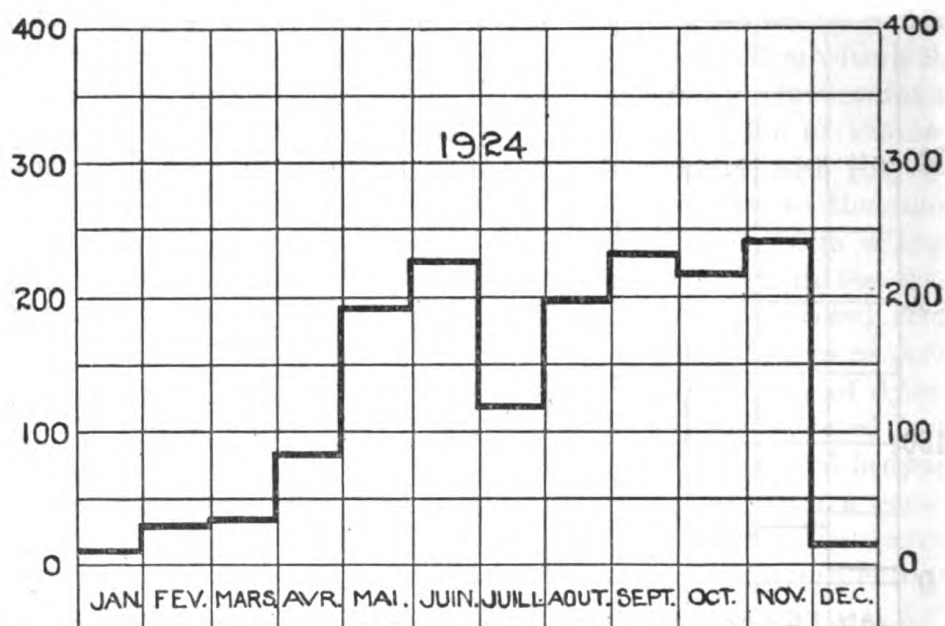


FIG. 3.—Rainfall in millimeters for each month of the year 1924, for the stations investigated. Compare with Figure 4

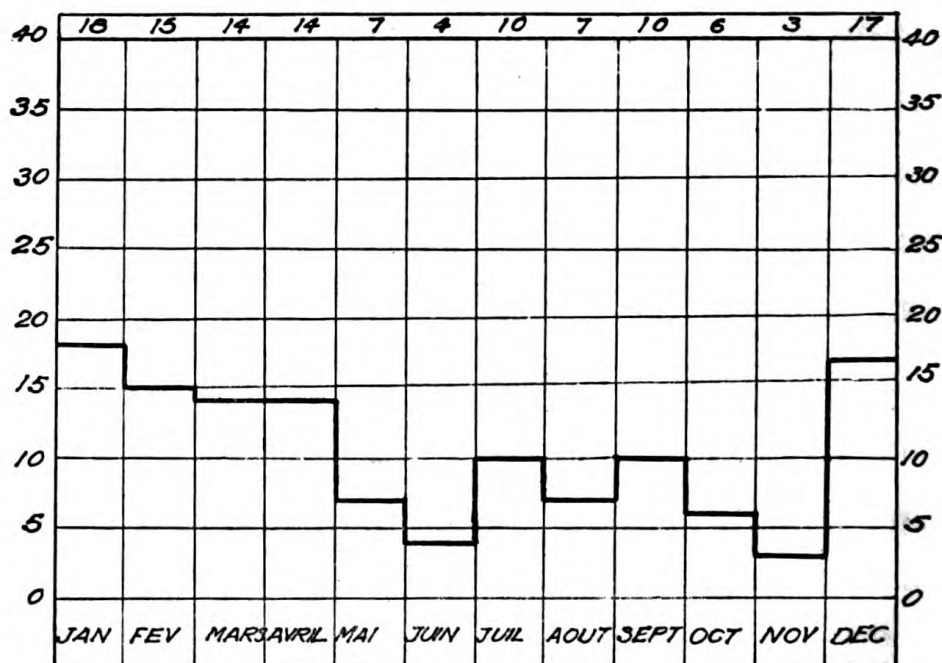


FIG. 4.—Number of cases of dysentery admitted each month of the year 1924

one. One will find many uncovered food trays in any section of Haiti. The average native of the lower class eats with his hands entirely, and the washing of the hands before meals is practically unknown. The tropical fruit falls to the ground and is eaten without paring or washing. The rural natives have no toilets nor privies; they deposit their feces on the ground at the most convenient place, and their migratory habits make soil pollution universal. One can imagine the condition of the trail after a native with dysentery, having a stool every few minutes, has passed. It is believed that in Haiti dysentery is mainly a water-borne disease, although the habits of the natives and the methods of preparing their food and eating anything they can obtain play their part.

(E) BEST METHOD OF TREATMENT

It was the main purpose of this investigation to test the efficacy of the different methods of treatment and to evolve a routine which would give the lowest case mortality under existing conditions.

The following preliminary routine was carried out: All cases of diarrhea were classed as potential dysentery and immediately segregated until a diagnosis could be established; all patients were required to remain in bed; the use of the bedpan and urinal was compulsory; all excreta disinfected. On admission an initial purge of 1 to 2 ounces of castor oil was administered. The diet was a fairly nutritious one, meat juices, thick soups, broth, oatmeal, and mashed potatoes. All cases had native hospital corpsmen in attendance.

Bismuth preparations.—Prior to the beginning of this investigation the routine treatment by bismuth preparations and irrigations of physiological salt and boric acid solutions had been used. Under this treatment the case mortality remained high, and, in our opinion, this method of treatment is not to be recommended.

Treatment by salines.—We treated a series of 50 cases by the use of salines. The preliminary treatment was the same as outlined above. The initial purge was followed by the administration of sodium sulphate 4 grams in water every 2 hours for the first 24 hours after admission; after this it was given every 3 hours during the second 24 hours; then, if the stools were not feculent, it was continued at 4-hour intervals until they become so. In this series of 50 cases we had 14 deaths, a case mortality of 28 per cent. All cases were severe infections; the exhaustion was extreme; toxemia marked; loss of body fat severe. It seemed imperative to give a more nutritious diet if the case mortality was to be reduced to any appreciable extent. In looking for articles of food, cost and availability had to be considered, and the food had to be such that the patient could assimilate it readily. Corn sirup (glucose) was

one substance, fairly cheap, available, and easily utilizable. It was therefore decided to add corn sirup to the diet and to give this in a warm solution of sodium bicarbonate. We treated another series of 30 patients with the saline purgative, and the only change made was the addition of the corn sirup and sodium bicarbonate solution to the diet. This was given in liberal quantity every three hours. All patients took it readily. In this series of 30 cases we had six deaths, a case mortality of 20 per cent. Saline purgative series, 80 cases, 20 deaths. Case mortality, 25 per cent.

Treatment by serum (intravenously).—At this time the polyvalent serum, previously ordered, arrived, and we immediately commenced to give this preparation to all new cases. Due to lack of facilities for storing and keeping serum at outlying stations, it had to be kept in Port au Prince and forwarded by plane or messenger as the necessity occurred; this prevented the administration of the serum on the first day of the disease in many cases.

1. The preliminary treatment in all cases was segregation, rest in bed, castor-oil purge, and diet as outlined, plus the glucose and sodium bicarbonate solution. In the treatment of the first 20 cases with serum we gave 50 mils intravenously and repeated if necessary. With this dosage there were 4 severe serum reactions and 2 deaths, giving a case mortality of 10 per cent. The type of cases treated were all severe and not differing from those treated with salines.

2. The dose was reduced to 20 mils, intravenously, and a second series of 20 cases was treated. In this series there were 3 severe reactions resulting in one death two hours after receiving the second dose. Two deaths occurred in this series; a case mortality of 10 per cent.

3. *Treatment by serum (subcutaneously and intramuscularly).*—It was then decided to treat a series of 50 cases by giving the serum subcutaneously or intramuscularly. The preliminary treatment remaining the same, 20 mils of serum was given subcutaneously on admission and, if necessary, 10 mils 10 hours later. In this series 4 deaths occurred, a case mortality of 8 per cent. No reaction occurred in this series.

4. *Serum treatment, combined with salines.*—In another series of 50 cases we gave the routine saline purgative treatment combined with serum given in 20 and 10 mil doses subcutaneously or intramuscularly. In this series 3 deaths occurred, a case mortality of 6 per cent. There were no serum reactions.

5. In November, 1924, facilities for keeping and storing serum at several outlying stations were established. From the date (November 1, 1924, to April 1, 1925) there were treated a total of 35 cases with 1 death, a case mortality of 2.8 per cent.

6. In 1923 and 1924 there occurred in Port au Prince and the Department of the South 34 cases of dysentery among the gendarmes. All were treated with serum and there were no deaths. The statistics for the entire Gendarmerie show that there was 59 admissions and 1 death. A case mortality of 1.7.

7. In the forces of occupation we treated 5 cases with no deaths. Two of these cases were children, one 3 years of age and one 9.

The tabulated results of the serum treatment follow :

Series	Cases	Class	Route	Average number doses serum	Case mortality	Number serum reactions
1.....	20	Prisoners.....	Intravenously.....	3	10	4
2.....	20	do.....	do.....	3	10	3
3.....	50	do.....	Subcutaneously or intramuscularly.....	3	8	0
4.....	50	do.....	Subcutaneously or intramuscularly salines per os.	3	6	0
5.....	35	do.....	do.....	3	2.8	0
6.....	34	Gendarmes.....	do.....	3	0	0
7.....	5	Americans.....	do.....	3	0	1

Glucose in dysentery.—Textbooks mention that the feeding of lactose to dysentery patients seems to do good. Lactose not being available, we substituted glucose and found that patients receiving this article in their diet did not become so emaciated nor so exhausted as those not receiving it. Loss of body fluids is best prevented by the use of glucose and sodium bicarbonate given in warm solution.

Danger of serum reaction.—There is no doubt that danger exists in giving serum intravenously, and it did not appear to us that the amount administered made any great difference when given by this route. All serum given in this manner was warmed, administered slowly, and the patient's condition carefully watched. Doctor Lane, administrator of the Haitian General Hospital, stated that he had had similar results. Only one reaction occurred in the cases in which serum was administered intramuscularly or subcutaneously (a 3-year-old American child), and the case mortality was less where the serum was thus given than when administered intravenously.

COMPLICATIONS

Arthritis was the most common complication encountered and occurred approximately as often in those cases treated with salines alone as in the cases receiving serum. Joints were involved in the following order of frequency: Knee, elbow, wrist, shoulder, and hip. Neuritis, with muscular atrophy, occurred in a few cases; paralysis of both legs in one case. It seems that when the destruction of the mucosa reaches a certain extent no amount of treatment will cure the case; as he is unable to assimilate sufficient food to maintain life, he becomes gradually emaciated, wastes away, and dies.

Constipation was the most annoying afterresult, and nearly all cases which, in convalescence, became constipated had a recurrence of dysenteric stools. Constipation during convalescence is to be guarded against.

Prior to the beginning of the fiscal year 1923 (October 1, 1922), prison statistics are not available; hence the case mortality of bacillary dysentery is unknown. This investigation covered about half the enlisted strength of the Gendarmerie and about half the prison population of the Republic. In the area not under investigation various methods of treatment were followed and the case mortality remained high. Prison statistics show that from May to December, 1923, both months inclusive, there were 241 admissions with bacillary dysentery, with 80 deaths and 19 released from prison suffering from the disease. The ultimate outcome of those released could not be obtained. For this period there was a case mortality of 33.15 per cent. In the area under investigation, during this same period, the case mortality was reduced to 25.6 per cent by the use of salines and a limited amount of serum. For the calendar year 1924, there were 200 admissions, 33 deaths, and 11 released, giving a case mortality of 16.5 per cent. In the prisons of the area under investigation the statistics show that by the use of serum and salines the case mortality during 1924 was reduced to 8 per cent.

CONCLUSIONS

(a) The majority of cases of dysentery in Haiti are of bacillary origin (Shiga type).

(b) Dysentery is endemic in Haiti and at times severe epidemics occur.

(c) It is necessary that a careful physical examination of the patient be made and all other diseases causing blood and mucus in the stools be eliminated. It is possible to make a fairly accurate diagnosis of acute bacillary dysentery by a careful microscopical study of the exudate. This is the quickest and one of the best methods for confirming the clinical diagnosis in field work, for it does not require a complicated laboratory technique, saves time, and permits the institution of immediate and appropriate treatment. (Dr. George C. Payne of the International Health Board, now in Haiti, concurs in this conclusion.)

(d) The poorly nourished and emaciated individual is prone to become infected. The spread of dysentery can be prevented in institutions by isolation of patients; by disinfecting all excreta, bedding, and linen of patients; segregation of new arrivals for a period of eight days; daily disinfection of living quarters; allowing only healthy individuals to prepare or handle food for others; and by disinfecting latrines at frequent and regular intervals.

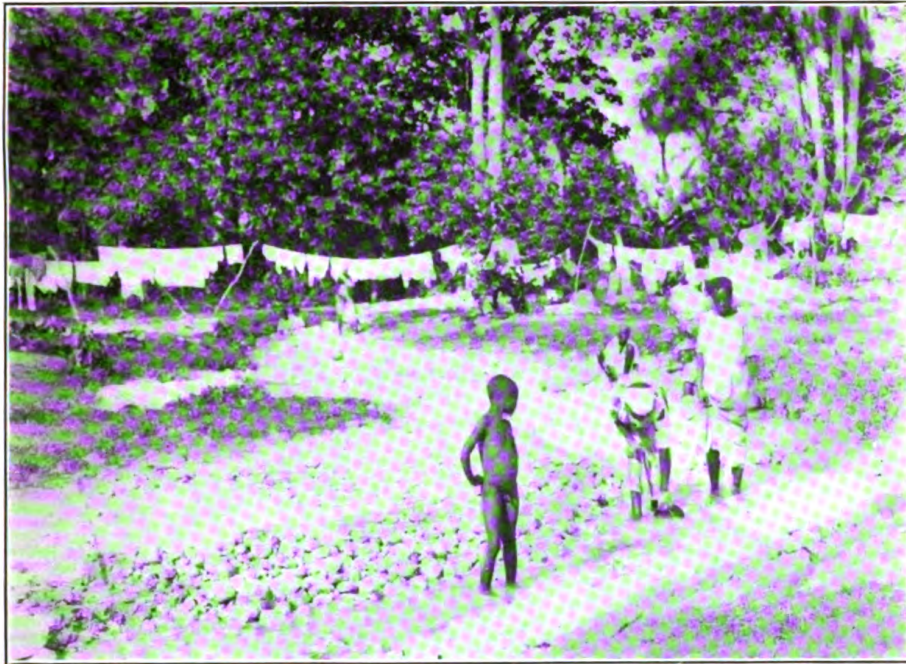


FIG. 5.—WASHING CLOTHES, BATHING, AND OBTAINING DRINKING WATER FROM A SMALL STREAM. ABOVE THIS POINT MANY WOMEN AND CHILDREN WERE BATHING



FIG. 6.—NOTE THE GIRL OBTAINING DRINKING WATER BELOW THE POINT WHERE THE WOMAN IS BATHING

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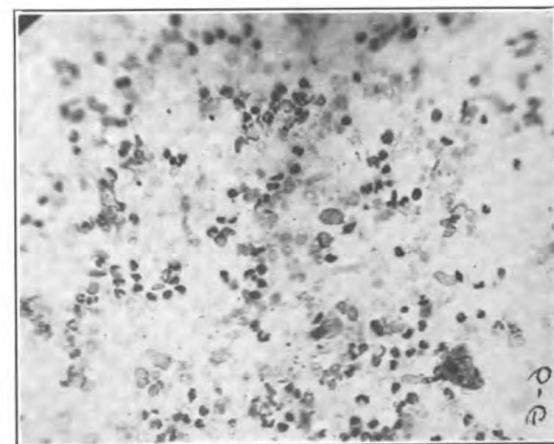


FIG. 7.—TYPICAL EXUDATE OF
BACILLARY DYSENTERY

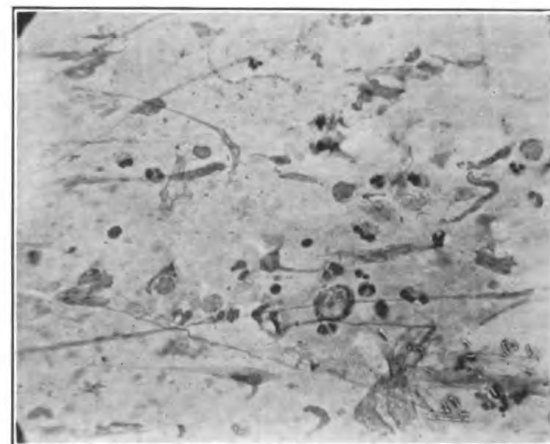


FIG. 8.—EXUDATE OF BACILLARY
DYSENTERY, SECOND DAY OF
TREATMENT. NOTE DIMINU-
TION OF CELLULAR CONTENT

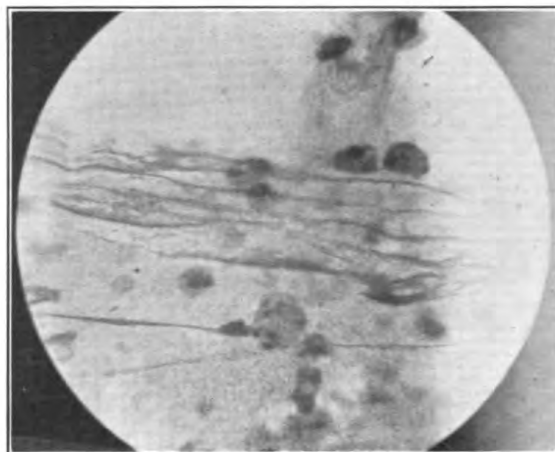


FIG. 9.—EXUDATE OF BACILLARY
DYSENTERY AFTER 4 DAYS' TREAT-
MENT



FIG. 10.—THIS PATIENT HAD BEEN CONVALESCENT FROM BACILLARY DYS-
ENTERY FOR 32 DAYS. DIED 7 MONTHS LATER FROM MALNUTRITION

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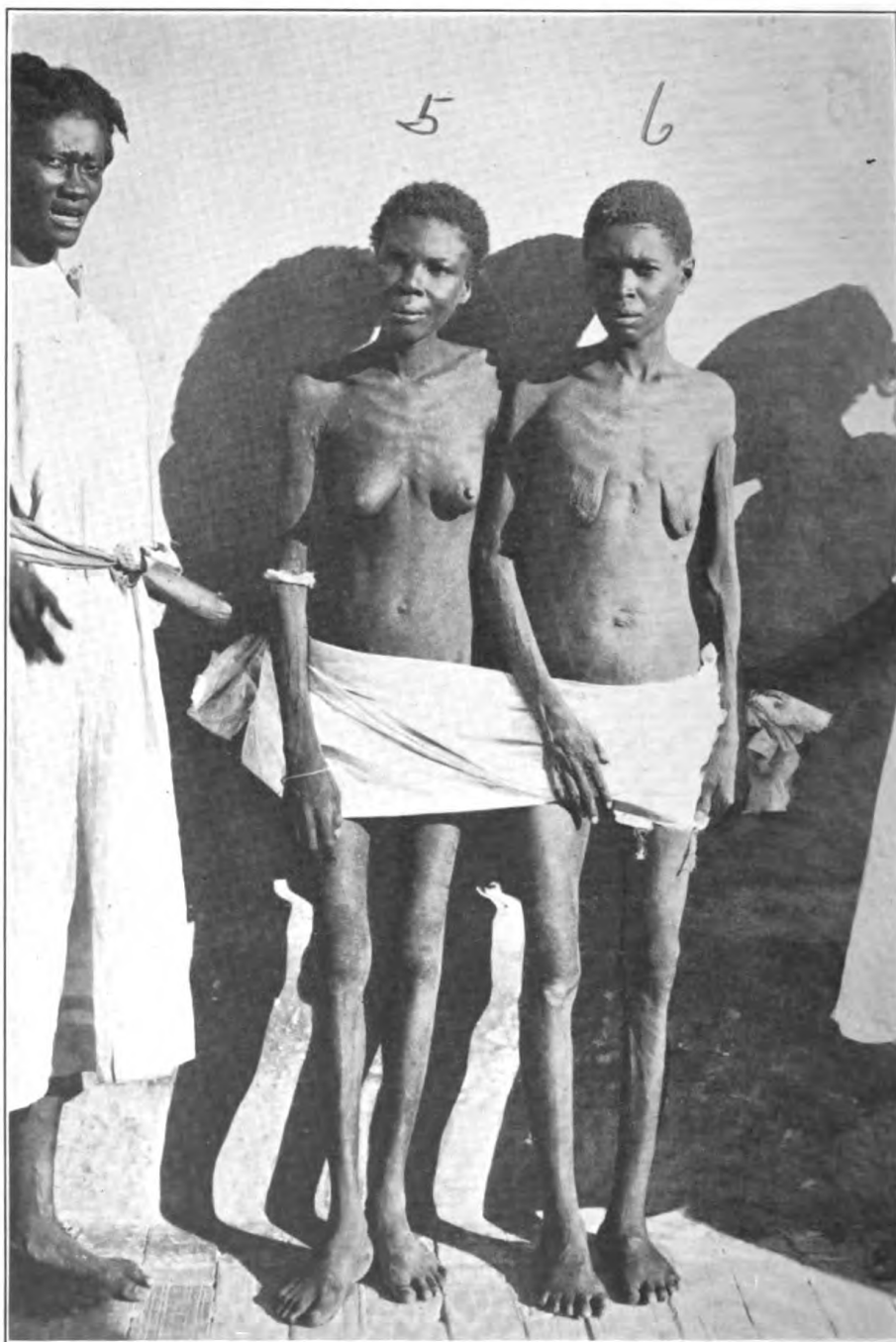


FIG. 11.—CASE 5.—SEVERE BACILLARY DYSENTERY LASTING 16 DAYS. ARTHRITIS OF RIGHT KNEE AND RIGHT ELBOW. RAPID EMACIATION. RECOVERY. PICTURE MADE 18 DAYS AFTER CONVALESCENCE BEGAN. SALINE, GLUCOSE TREATMENT. CASE 6.—SEVERE BACILLARY DYSENTERY OF 12 DAYS' DURATION. RAPID EMACIATION. PICTURE TAKEN 18 DAYS AFTER CONVALESCENCE BEGAN. PATIENT ALIVE 17 MONTHS LATER. NO GAIN IN WEIGHT FOR 14 MONTHS

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FIG. 12.—CASE 3.—ON SICK LIST 22 DAYS WITH DYSENTERY. 55 DAYS WITH ARTHRITIS. PARTIAL PARALYSIS OF BOTH LEGS. DIED 9 MONTHS AFTER ADMISSION FROM MALNUTRITION. CASE 4.—ON SICK LIST WITH DYSENTERY 21 DAYS. WEIGHT ON ADMISSION, 131 POUNDS; ON DISCHARGE, 92 POUNDS. RECOVERED

464—5

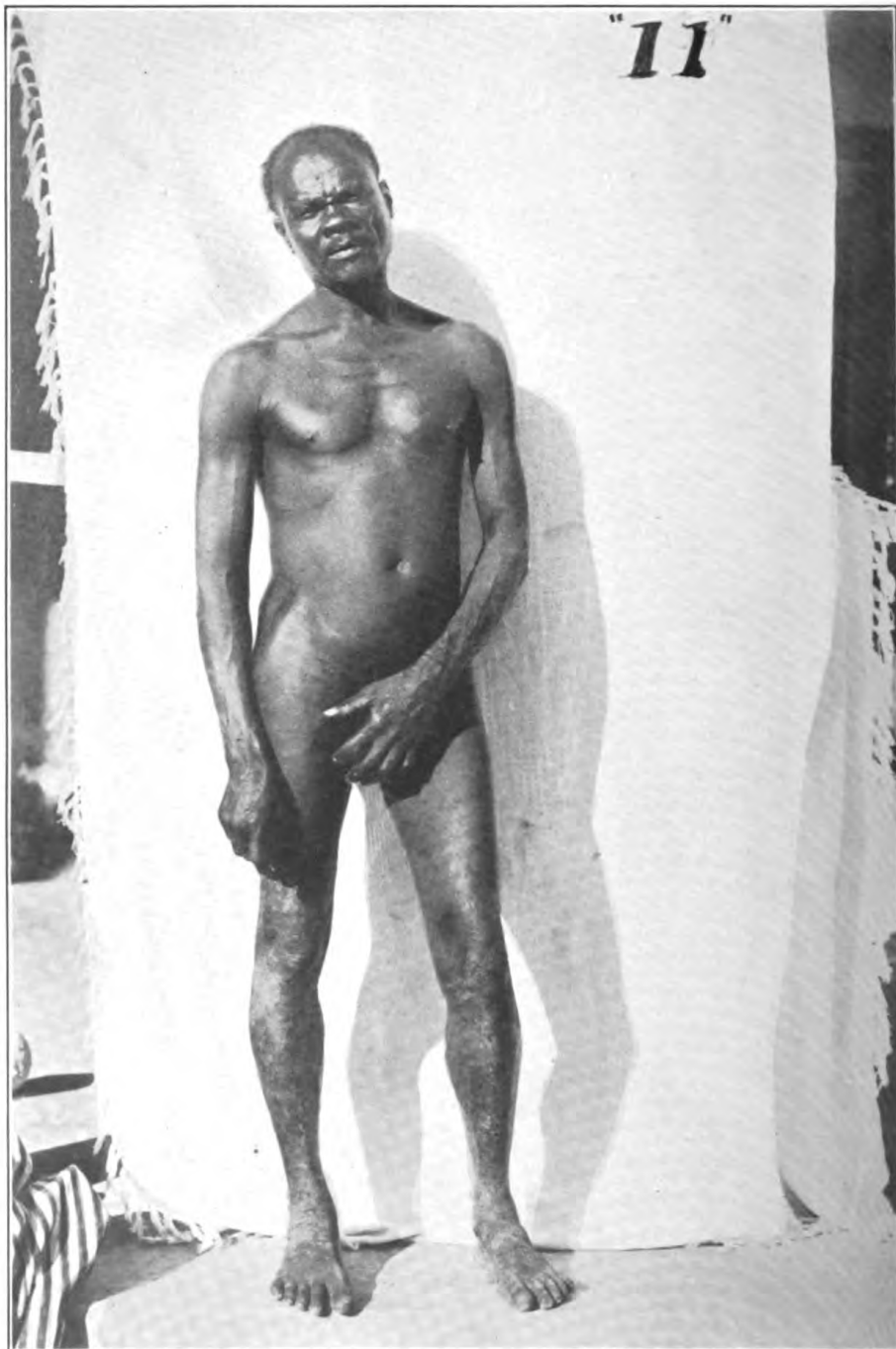


FIG. 13.—DYSENTERY LASTED 9 DAYS. SERUM AND SALINE TREATMENT. RAPID RECOVERY. THIS PICTURE GIVES AN IDEA OF THE TYPE OF PRISONER WHO HAS BEEN CONFINED FOR MORE THAN 6 MONTHS

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(e) The best method of treating bacillary dysentery is by the combined use of serum and salines, plus a good nutritious diet. It is believed that the addition of glucose to the dietary in our cases saved many lives.

As a result of the above work and in view of the conclusions reached, the Medical Director has issued an order that all cases of bacillary dysentery be treated by the intramuscular or subcutaneous administration of a polyvalent serum plus salines and a nutritious diet in which is included glucose in solution.

He has further directed that, prior to beginning treatment, several smears of the muco-pus portion of the stool be made and forwarded to the laboratory at Port au Prince, Cape Haitien, or Hinche for examination.

INFLAMMATION OF BONE¹

By H. W. GILLEN, Lieutenant (Junior Grade), Medical Corps, United States Navy

The dense structure of bone, tendons, and cartilage modifies the process that occurs in inflammation of these structures. Bone is dense and resistant and offers very little space into which exudation can occur. It offers no elasticity to favor the swelling which is the natural result of inflammation. As a result, any diluting action of the exudate is minimized; and if pain can be ascribed to the action of toxin upon the nerve endings, we can understand why it is that pain is frequently severe.

However, the process is the same as elsewhere; there is the same tissue destruction and migration of leucocytes, although, from the dense character of the bony matrix, the necrotic processes do not show themselves so rapidly. It also affords protection to a large extent against bacteria as well as against the solvent action of the products of the pus cells.

Inflammation of bone is classified according to the particular tissue it involves—periostitis, which arises in the periosteum; osteitis, which arises in the cancellous bone tissue; and osteomyelitis, which arises in the medullary cavity; or, as one process, if severe, leads to the other, the condition is described as panosteitis.

The study of these conditions is complicated by the fact that whereas an infective agent, acting intensely, leads to necrosis and absorption of the bony substance, in the areas of surrounding hyperemia there is set up coincidentally a productive process, leading, in the deeper parts of the bones, to increased thickness of the lamellæ and greater density of the tissue and, on the surface, to the formation of new bone layers or of osteophytes, irregular processes of new bone.

¹ From U. S. Naval Hospital, Norfolk, Va.

In extreme cases the intensity of the inflammatory process and the presence of tension may lead to the necrosis of relatively large masses of bone, which undergo a very slow process of absorption while, simultaneously, the periosteum gives origin to new bony layers. As a result of these there is formed a sequestrum surrounded by an involucrum, with associated thickening and deformity. Usually the purulent fluid surrounding the sequestrum makes its way along the line of least resistance, through some area of weakened periosteum, into the subcutaneous tissues and to the surface, giving rise to one or more sinuses.

The condition usually results from the presence of microorganisms that reach the bone either through the blood stream or through lesions in the external soft parts. The chief bacterial infectious agents are the *Staphylococcus pyogenes*, streptococci, *Gonococcus*, tubercle bacillus, typhoid bacillus, *Pneumococcus*, *Treponema pallidum*, diplococci, and *Bacterium coli communis*.

Of the blood infections, the most frequent are caused by typhoid bacilli, residual in the periosteum after attacks of typhoid fever, and by staphylococci, brought from foci of suppuration in distant parts of the body.

Direct infection sometimes occurs in compound fractures and in surgical operations exposing the inner structure of the bone, as well as in cases of suprajacent disease, as in chronic leg ulcers. The susceptibility of the bones to hematogenous infection seems to be greatest in youth and to decrease with age. Direct infection through wounds may occur at any age.

The post-typhoidal infection usually takes the form of periostitis and affects the shafts of the long bones or the surfaces of the flat bones, rarely being severe or destructive. Staphylococcus infections and the more rare streptococcus infections localize in the cancellous tissue, the periosteum, or the marrow.

The typhoidal and staphylococcal infections tend to remain localized, the streptococcal infections to spread. Both staphylococcal and streptococcal infections may spread and cause phlegmonous suppuration of the entire marrow of a long bone and sometimes become distributed through the blood so as to occasion fatal generalized infection.

Inflammation of the periosteum almost never secondarily affects the joints, because it extends only to the articulating cartilage, where its invasion is checked. Suppurative inflammation of the cancellous tissue of the ends of the long bones frequently does so by extension into the epiphysis, with subsequent perforation of the articular cartilage. Extension of inflammation from the bone into the joint or from a joint to a bone is called osseous arthritis.

Periostitis is the result of inflammation due to the activity of microorganisms in the periosteum. Acute periostitis may be of two forms—simple and suppurative. The simple form shows itself in noninfective traumatic infections and in infections of low virulence, and is characterized by a mildly acute course with infiltration and subsequent thickening of the periosteum, stimulation of the genetic layer to active bone production, resulting in a local increased production of bone in the form of osteophytes. Suppurative periostitis is much more acute, involves a larger area, and shows itself as an accumulation of pus cells within the periosteum and then between the periosteum and bone. The periosteum is so dense a tissue that the tendency of the pus is to spread between it and the bone rather than to burrow outward and evacuate externally. With the advancement of the disease the periosteum may undergo atrophy at some point, the pus thus extending into the surrounding tissues and setting up a periosteal suppurative process. The inflammatory process may extend along the vessels into the marrow, inducing a panosteitis.

The dissection of the membrane from the bone destroys the small vessels through which its superficial layers are nourished. If the extent of the dissection is limited there may be enough anastomosis between the vessels of the Haversian systems, the endosteum, and the more remote periosteum to maintain the nutrition. If the exudate has a tendency to work its way into the small bony canals, compressing the vessels not otherwise disturbed, the vitality of the osseous tissue is further threatened. There is little tendency for the elevated periosteum to form new bone, because the necrosis kills the osteoblasts of the inner layer. If the vitality of the bone is not destroyed and the inflammatory process subsides, the pus may be absorbed; or, if the contents are evacuated, the whole process may disappear, with no more alternation of the bone than a slight thickening of the membrane. If the disease spreads and the dissection of the periosteum from the bone is increased beyond the point at which the nutrition of the latter is possible, then a necrosis of bone takes place. The extent of the necrosis is usually limited to a few of the superficial bony lamellæ, because the deeper layers are nourished by the endosteal vessels that have not yet been affected by the inflammation.

There is no change in the appearance of the dead lamellæ; they resemble prepared macerated bone. They are smooth upon the surface, but the vessels are occluded, the cells are dead, and the chemical composition is altered, so that the adjacent living tissue seems retracted at the junction of the two. There is bone absorption at the margins of the necrotic area. An increase in osteoclasts—large and giant cells derived from the osteoblasts, engaged in the destruction of the bony tissue—occurs. The necrotic tissue slowly

separates from the living, healthy tissue by lamination. During the process of absorption of the dead tissue, activity of the inflammation having subsided and the pus having been evacuated, the chief source of disturbance is removed and all that remains to interfere with recovery is the presence of a sequestrum. After the inflammatory process has subsided the osteoblasts of the inner layer of the periosteum are restored through the multiplication of the neighboring cells and the bone-forming function is restored. A new layer of bone soon forms about the sequestrum on the inner side of the periosteum. The new periosteal bone incloses the sequestrum with living osseous tissue—the involucrum.

The larger the sequestrum the longer it takes to absorb it and the thicker and denser becomes the involucra by which it is covered. Very large sequestra may be beyond the possibility of absorption, so that it may remain throughout the life of the individual, discharging the transformed products through various cloacæ unless surgically treated. All that is necessary is to lay bare the seat of disease, chisel away the involucra by which the sequestrum is held in position, remove the dead bone and neighboring granulation tissue, and return the periosteum to form new lamellæ of bone in contact with the healthy bone tissue below.

Recovery in cases without extension to new tissue is slow. The pus cells gradually disintegrate into amorphous, granular matter; the osteoblasts of the undestroyed trabeculæ begin the reconstruction of the bone, which is deposited in thin layers about the space occupied by the now transforming and disintegrated pus; and a cavity is formed which later may appear to be empty or filled with clear fluid—a bone cyst.

In osteomyelitis the primary infection occurs in the bone marrow. The condition is most common in the young and during adolescence, while the long bones are the most frequently affected. The disease usually begins as an infective epiphysitis.

The mild course of infection is modified in the case of the bony substance by the unyielding nature of the frame work. The exudate and infiltration of leucocytes react upon the vessels themselves, favoring thrombosis and the rapid production of the relatively large areas of necrosis. The inflammation is apt to extend to the periosteum, inducing suppurative periostitis, periosteal perforation, and the formation of fistulæ. If very acute, the process gives rise to a general pyemia, resulting in death; if less acute, there follow various stages of reactive development of new bone, although very often the acute stage passes on to the latest form of osteomyelitis, with tendency toward acute exacerbations from time to time, over a period of many months.

Various forms of chronic periostitis are described. Continued mild inflammation of the periosteum leads to bony overgrowth and the formation of osteophytes, referred to as *periostitis ossificans*. Excessive new formation of bone may lead to considerable deformity which may be permanent, in that there is not time enough during the life of the patient for the transforming and regulating function of periosteum and endosteum to effect its ultimate renewal and return the bone to its original true form. The periosteal overgrowth of bone after fractures, and the bony overgrowths through irritation induced by neighboring neoplasms or inflammation of overlying structures, are of this nature. Another type of periosteal inflammation, the *periostitis albuminosa* described by Ollier, in which a thick serous fluid, containing albumin and a few pus cells and some fibrin, collects between the periosteum and bone, appears in mildly infective conditions, and differs merely in intensity from the more acute suppurative periostitis.

In long-continued inflammation of the bone substance two processes manifest themselves according to the virulence or concentration of the infective agents, viz, rarefaction and condensation. Rarefying osteitis is evidenced by the progressive absorption of the bony lamellæ. The marrow becomes increasingly vascular, and, through increased osteoblastic activity, the compact bony tissue undergoes reduction and assumes a loose, spongy appearance. Some authorities state that in these inflammatory processes the presence of osteoclasts is not essential, but that the leucocytes possess the capacity of causing absorption of the bone, as occurs when the bone has already undergone necrosis, as in a sequestrum.

Condensing osteitis occurs where the irritation is not so intense, resulting in either of two events. There may be evidence of increased osteoblastic activity so that the lamellæ undergo progressive thickening and the marrow spaces become correspondingly reduced, or the marrow becomes less cellular and shows an increased fibrosis, the cells of this fibroid tissue undergoing metaplasia, forming bone corpuscles. If, coincidentally, there is progressive periosteal new development the shaft may become thickened and the central marrow may be completely replaced by very compact bone, known as eburnated bone.

The roentgenologic evidences of osteomyelitis are dependent upon the occurrence of bone destruction and new bone formation, both of which are well defined in the ordinary case, but one or the other change may predominate and give rise to difficulty in diagnosis.

In diffuse osteomyelitis bone destruction is usually the first change to be observed. Irregular reduction in density is seen in the cancellous bone and in the cortex of the end of the shaft, extending from

1 to 2.5 centimeters from the epiphyseal line. It is first noticed in from 7 to 14 days, depending upon the size of the bone involved, the smaller bones having the earlier change. Evidence of reduction of density in the compact bone does not appear for some time afterward, depending upon the thickness of the cortex involved and its relation to surrounding living bone. New bone formation from the involved periosteum produces a joint shadow along the cortical surface which can be seen at the same time or soon after the first evidences of reduction in density. Shadows from endosteal new bone may also appear at this time, but are usually seen later, due to the fact that they are feeble and are rendered less distinct by overlapping cortex. The peripheral membrane springing from living cortex casts a shadow that is less dense than and continuous with that of the bone from which it springs. The portion covering dead cortex casts a fainter shadow than the dead bone that it surrounds, but the two shadows are not continuous, being separated by a space varying in width from $\frac{1}{4}$ to $\frac{1}{2}$ centimeter, which casts a very feeble shadow and represents the zones filled with granulations which surround the dead bone. Signs of irregular reduction in density appear in from three to six weeks along the line of junction of dead and living cortex. Frequently a notch is seen in the cortical line, which subsequently deepens, and eventually a complete, jagged zone of demarcation can be made out. The outline of the periosteal and endosteal surfaces of the dead bone may gradually become uneven, as the result of absorptive action by the granulations. Surfaces uncovered by involucrum may retain their original contour. As the density of the surrounding new bone increases that of the living old bone decreases. For a short distance away from the dead bone the density is sometimes irregularly reduced, due to rarefying osteitis. Beyond that the reduction is more uniform and may even be longitudinally streaked from dilated Haversian canals. This reduction is due to bone atrophy which arises from disuse. Frequently, by the end of 6 to 10 weeks, the reduction in density of the old living bone from rarefying osteitis and atrophy is greater than that of the dead bone produced by absorption of the granulation tissue. Consequently the dead bone at this time usually casts a heavier shadow than the old living bone, and, if not, its shadow is more uneven than that of the living bone, due to the irregular, worm-eaten structure of the latter.

The features by which the dead bone may usually be distinguished are its greater density, irregular contour, sharp outlines, pointed extremities, and the presence of a surrounding zone of low density, demarcating it from the living bone. Older osteomyelitis shows greater density of the newly formed bone, and reduced density, indicating cavity formation, in the regions of bone destruction. Sequestra

showing at a late date are usually much reduced in size and density. Sclerosing osteomyelitis may show regional enlargement and marked increase in density in both periosteal and endosteal regions without any signs of cavity formation.

Localized osteomyelitis usually results in rapid formation of one somewhat spherical shaped, central area of reduced density, which may be seen roentgenologically in 10 to 15 days, and becomes quite circumscribed in 3 to 4 weeks, as the absorptive changes cease. About it is a zone of increased density of varying degree. The density of the shadow is usually greatest about the abscess wall and gradually diminishes away from it.

From the preceding description of bone inflammation it is evident that the morbid conditions of the bone are largely the result of excesses, deficiencies, and irregularities of bone formation and absorption following infection or other injury and complicated by minute or massive destruction of the bony tissue which is difficult to remove.

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THE RED CELL SEDIMENTATION TEST¹

A REVIEW OF THE LITERATURE WITH A REPORT OF ITS APPLICATION IN OVER 150 CASES

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In the early times when venesection was practiced so extensively for many conditions, it is reported that Galen (131-201 A. D.) observed that in certain diseases there was a marked increase in the velocity of sedimentation of blood cells in the drawn blood. He noticed at times, particularly in the acute inflammatory processes, that the separation of cells from plasma occurred many times to a certain extent before coagulation had set in. To the supernatant serum the name *crustaphlogistica* or *crusta inflammatoria* was given and this phenomenon was regarded as a grave prognostic sign. As is the case with many things in early medicine it seems that these observations of Galen and others were forgotten or disregarded.

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This may be explained by the fact that wholesale venesection fell into disrepute.

In 1917 Robin Fahraeus, working at the University of Kiel, re-discovered the phenomenon, and in articles published in *Hygiea* and in the *Biochemische Zeitschrift* (1918) stated that a blood sedimentation test might be of value in diagnosing pregnancy, since the rate of sedimentation is somewhat increased in that condition. Since that time many other European workers have studied the test and its application, and the continental literature contains many articles dealing with practically every phase of the subject. Apparently very little attention has been paid to the test by the medical profession in the United States. At any rate, very little has appeared in the American literature concerning it.

What is the cause of the increased sedimentation rate in many diseases? Some very interesting scientific research has been done in the attempt to answer this question. One might naturally jump to the conclusion that a change in the number of cells or size of the cells is the explanation. But it was early found that while anemia, polycythemia, color index, etc., did register a minor influence on sedimentation velocity they were not the primary explanation of the phenomenon. It then became apparent that the rapid sedimentation was due to autoagglutination of the red cells, for cells which are in clumps because of their relatively diminished surface sink more rapidly than single corpuscles. But what is the explanation of the autoagglutination? This probably has not been fully explained. Briefly, there are two theories: (1) That there is an increase in the adhesiveness of the cell surfaces, and (2) that there is a lowering of the electrical burden of the cells which allows them to clump together. In 1904 Hoeber showed that red cells are negatively charged because they wander to the anode. Schurer and Eimer showed that red corpuscles in healthy men wander to the anode more quickly than those of pregnant women. They therefore concluded that the cells in pregnancy carry less of a negative charge and therefore do not repel each other so strongly, hence agglutinate more rapidly and the sedimentation velocity is increased. Further proof of this theory is found in the fact that if substances which increase the negative charge be added the sedimentation velocity is decreased. Viscosity of the blood depends upon a great many factors. The relative amount of albumen and globulin is known to be an important one. And it has been shown that while albumen carries a greater negative electrical burden than globulin, globulin has the higher viscosity. Hence an increase of globulin in the blood would increase its viscosity and at the same time decrease its negative charge, both of which would promote autoagglutination and

therefore cause more rapid sedimentation. Thus both theories of autoagglutination are compatible.

The European workers have attempted to develop a standard technique so that the end results might be expressed numerically for comparison. Several methods have been used, but they are all more or less alike, differing only in the caliber of the tubes, the amount of blood and anticoagulant used, the method of reading results, etc. The method of Linzenmeier probably has been most widely used. It is the method which has been used at this hospital. It is simple and the necessary utensils are easily obtained or made; therefore there is no good reason for changing the technique. The utensils used at this hospital are the following: A 1-cubic centimeter tuberculin syringe; several settling tubes, which were made from glass tubing of 5 millimeters diameter. In making these tubes pieces of glass tubing 7 centimeters long were cut off. One end of the cylinder was annealed in a Bunsen flame, thus forming a small test tube. These tubes were then accurately graduated by placing in each of them 1 cubic centimeter of water and marking the tube at the level of the meniscus with a file. Below this 1 cubic centimeter line, at distances of 6, 12, 18, and 24 millimeters, respectively, other marks were made. (It may be possible to purchase such tubes as these, but they are very easily made and only a dozen or so are required.) Finally a flask of sterile 5 per cent sodium citrate completes the necessary equipment.

To do the test the settling tube should be absolutely clean and dry and placed in a rack which holds it in a vertical position. The syringe should be rinsed with the sodium citrate solution. Two-tenths cubic centimeter of the sodium-citrate solution is drawn into the syringe. The cubital vein is then punctured after short stagnation of the blood and the syringe is filled to 1 cubic centimeter. The entire mixture is immediately transferred to the sedimentation tube, and the tube should be inverted twice to prevent clotting. If the blood clots, the test is no good and should be discarded. It is well to emphasize the point that the blood should be taken, if possible, without any stagnation through compression of the veins of the arm with a tourniquet because stagnation of the blood increases the relative cell content and CO_2 , both of which alter the results. Furthermore, great care should be taken that there is no accidental mixing of different bloods when several tubes are set in the same rack.

To read the test it is necessary only to note the time which is required for the upper levels of the cells to reach the 6, 12, 18, and 24 millimeter marks, respectively. If for any reason one should omit reading the test at the proper time, or in case there is an indefinite line of demarcation between the cells and plasma, the suspension may be remixed and the cells allowed to settle as before. The

sedimentation rate for any particular suspension is practically constant, provided, of course, that the suspension be not allowed to set more than a few hours before the results are estimated. The temperature of the laboratory should be fairly uniform, since variation in temperature alters the sedimentation rate slightly.

There has been some difference of opinion as to what should be used at the end point in reading results. Linzenmeier recommends using the 18-millimeter line, and this is the one used at this hospital. Another very practical way of reading the test is to note the amount of sedimentation at the end of one hour and two hours, respectively. If it is desired to do so, the results of sedimentation may be expressed graphically. To do this one uses as ordinates the heights of the column of corpuscles at regular time intervals, the time intervals being plotted upon the abscissa. In normal blood it has been noted that the graph of sedimentation is practically a straight line. Blood in which the sedimentation velocity is increased gives a curved line as a graph, which is usually sharply downward at first but gradually approaches, more and more, a straight line as the limits of sedimentation are reached. In some cases where there is a marked pathological process going on, such as pneumonia, the cells seem to settle by "jumps" or "drops," so to speak.

Outline of results of sedimentation velocity in health

Sex	Age	Average results
Both.....	0 to fifth week.....	24 millimeters in 25 hours.
Do.....	Fifth week to about fourteenth year.....	24 millimeters in as short a time as 100 minutes.
Male.....	Adults.....	24 millimeters in about 20 hours.
Female.....	do.....	24 millimeters in about 13 to 16 hours except during menstruation, in which it is about 10 hours.

In the above outline it will be noted that there is a marked variation in childhood. By some this has been attributed to the lack of stability during youth and the influence of many minor infectious diseases. Results vary considerably from time to time on the same child. However, in healthy adults sedimentation velocity for any particular individual shows very little variation. There is difference of opinion as to whether food, time of day, exercise, etc., have any effect.

The following is an outline compiled from the literature showing the results of the test in a variety of conditions with notes as to its value as set forth by the authors who have used it in each particular condition. It is to be remembered that, with the exception of pregnancy, the rapidity of sedimentation depends upon the amount of inflammation or tissue destruction, so that one has only to reason how much of the above is present to know what the results will be.

Pregnancy.—Linzenmeier found that the sinking time in normal pregnancy after the fourth month was 180 to 300 minutes for 18 millimeters. In extra-uterine gestation the time is between 40 and 90 minutes. In cases where it is less than 40 minutes some complication as secondary infection is present.

Salpingitis.—Sedimentation of 18 millimeters in less than one-half hour indicates virulent bacteria in the adnexa and no operation should be performed. The test, it will be seen, might be of value in differentiating acute salpingitis from acute appendicitis in which the test is practically normal unless there be an appendiceal abscess. Slow sinking time in salpingitis (1 hour or more) indicates a run-out process and surgery is safe.

Uterine myoma.—Nonmalignant tumors, according to Rudolf Pewny, give a practically normal sedimentation rate. So the test might be of value in differentiating myoma from gravidity in the later months of pregnancy; also in differentiating benign tumors from malignant tumors and inflammatory conditions.

Urological conditions.—Uncomplicated acute and chronic urethritis—normal. Prostatitis, epididymitis, cystitis, etc., give increased velocity, depending upon the severity of the infection. Cancer of the bladder and benign papilloma give rapid sedimentation if hemorrhage or cystitis is associated. Simple prostatic hypertrophy gives a normal rate, unless cystitis be superimposed. Hence the test should be of value in differentiating adenoma from carcinoma of the prostate. Tuberculosis of the kidney gives rapid sedimentation, depending upon the extent of tissue destruction. Uncomplicated stone of the kidney or ureter gives negative results. The test, of course, is negative in mobile kidney and positive in malignancy of the kidney.

Appendicitis, peritonitis, etc.—Uncomplicated acute appendicitis gives practically normal results. In peritonitis velocity depends upon extent of inflammation.

Gall stones.—Very rapid sedimentation present before icterus or fever occurs.

Arthritis deformans.—Normal sedimentation rate.

Tuberculous joints.—Increased sedimentation rate.

Fractures.—Increased sedimentation rate after 24 hours.

Hyper and hypo thyroidism.—Normal sedimentation rate.

Malignant tumor.—Increased sedimentation rate, provided there is cell necrosis or secondary inflammation. It will be seen that the test might be of value in differentiating cancer of the esophagus from diverticula and cardiac spasm, and malignant disease of the stomach from chronic peptic ulcers.

Tuberculosis.—Increased sedimentation rate, depending upon the activity of the process.

Psychiatry.—Glaus records increased sedimentation rate in senile dementia, neuro-syphilis, general paralysis, catatonia, and in the period following an epileptic seizure. Constitutional psychopathies, neurasthenia, hysteria, manic depressive psychosis, paranoia, post-encephalitic parkinsonism give normal results.

The test has now been applied at this hospital in about 150 cases. The list comprises just such cases as are ordinarily found in a naval hospital. I have had no experience in applying the test in gynecological cases. A large percentage of the tests have been made on patients suffering with pulmonary tuberculosis. I have done the test upon several members of the staff who volunteered to act as controls. These persons were, of course, healthy male adults, and the sinking time for 18 millimeters varied from $4\frac{1}{2}$ to 9 or 10 hours. (Note: No significance can be attached to slow sedimentation rate.) From the above I think we may draw the conclusion that the individual whose blood corpuscles settle rapidly has something wrong with him, even though it can not be demonstrated by physical examination or short clinical observation.

In looking over the results of the test on cases in this hospital the sedimentation time for 18 millimeters, which has been used as the end point, has been so variable in any one disease that it is useless to try to give the results in any tabular form or attempt to estimate such a thing as an average sedimentation rate for any particular disease. For example, I have found the sinking time in the acute pneumonias as low as 15 minutes during the fever stage. Then during the convalescent period the sedimentation rate slowly decreased until it was normal when recovery was complete. Several cases of empyema have shown the same thing, namely, during the acute stage the sedimentation rate was very rapid and the decrease in sedimentation ran parallel with the improvement in the patient's condition. The test has been applied in several cases of diabetes mellitus and found normal. As stated before, most of these tests have been done on patients with pulmonary tuberculosis. The test is now done routinely on every tuberculosis case about once a month.

It has been my observation in these pulmonary tuberculosis cases that sedimentation rate is appreciably accelerated by fever, so that in judging the progress of any patient by the test it should be done, if possible, at corresponding times of the day, preferably in the morning when the patient has no fever.

I am indebted to Doctor Miller for the clinical data on these cases. He has observed that the decrease in sedimentation time has run strikingly parallel with the clinical improvement of the patient. For example, many of the cases upon admission to the hospital gave a sedimentation time of one-half hour or less. These patients were,

of course, put upon an antituberculous régime of bed rest, fresh air, good food, etc., and in the course of a few weeks, if the patient improved sufficiently to be allowed out of bed, the sedimentation time would be one hour or more. But the question may be asked of what value is a test which runs parallel with clinical improvement. I should like to emphasize that the test is certainly of value in two ways: First, if the test is normal, the patient does not have active tuberculosis; second, in the field of private practice the doctor does not have his patient under daily observation as we do in a hospital. Thus he has in the sedimentation test a very simple procedure for telling whether his patient is gaining or losing, even though he sees him infrequently.

In conclusion I should like to call attention to the fact that the sedimentation test is a very general test and that the rapidity of sedimentation in any condition, with the exception of pregnancy, apparently depends upon inflammation or the absorption of toxin from cell destruction, or bacterial destruction. Therefore its value in diagnosis can be considered as a laboratory adjuvant only. In tuberculosis especially the results in this hospital seem to justify the routine use of the test both as an aid in diagnosis and in following the clinical course of the disease.

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THE VIENNA CLINICS

By C. W. LANE, Lieutenant, Medical Corps, United States Navy

On November 28, 1903, at a Thanksgiving Day banquet of the American physicians in Vienna, a motion was made and carried that a committee be appointed to organize a society composed of English-speaking physicians. February 6, 1904, the committee called a meeting and that night founded the American Medical Association of Vienna. In 1908 permanent club rooms and a library were established. At the time the association was formed there were only 35 members. There are now over 3,000 life members. One who has taken a number of courses and has been in an active status the mini-

imum length of time prescribed is issued a certificate of life membership in the association. Graduates of class A colleges are admitted to membership.

A desk secretary is employed to care for the association's correspondence and to give any information that may be desired by newly arrived members. Orientation committees are appointed to assist in making up classes in the various subjects or to help in arranging for some special course. All classes and courses are posted on a large bulletin board in the club rooms. Every branch of medicine and surgery is included. Lectures are given in German or English. A knowledge of German is quite desirable. University of Vienna faculty members are in harmony with the association, and it is through this cordial relationship that many excellent courses are made possible. The wealth of material available for teaching purposes attracts the medical man to Vienna. The Allgemeines Krankenhaus, a hospital of 2,600 beds with over 45,000 admissions annually, is the center of the medical sphere. There are many other large hospitals, however, in which association members take special courses. The Kaiser Jubiläums-Spital, in the immediate suburbs, was completed just before the outbreak of the World War, and it is first class in every particular. It has 1,000 beds with a Physico-Therapeutical Institute and a large Pathological Institute which is particularly well equipped. In conjunction with this hospital is a state village for 7,000 aged, feeble, and chronically ill. This supplies abundant autopsy material. Other hospitals are the Kaiser Franz Josef-Spital, Rudolf-Spital, Elizabeth-Spital, Sophien-Spital, etc. There are about 12,000 beds in all available for teaching purposes.

Perhaps the most popular course is that given by Dr. Jacob Erdheim in gross pathology. He averages seven autopsies daily throughout the year, and these are complete in every respect. Dr. Erdheim does the dissecting in the morning, and in the afternoon he brings the specimens before the A. M. A. class. His discussion of each case from the history and clinical standpoint down to the ultimate pathological findings is complete, and his ability as a teacher can not be too highly praised.

Operative surgery finds a good field especially at the Kaiser Jubiläums Hospital. Cadaver work is always done on fresh bodies in which frequently the body heat is present. The tissues are therefore unchanged and work on them is much the same as work on the living. No preserving fluids are used. Competent surgeons act as personal instructors and all operations are a combination of instruction in anatomy, surgical judgment, and technique. The kidney and the upper, middle, and lower thirds of the ureter may be operated upon many times in the course of a few afternoons.

Austrian surgeons are using local anesthesia a great deal, and fully half of the abdominal work is done under this narcosis. Sub-total gastrectomies are very frequently done for gastric ulcer as well as carcinoma. Local anesthesia is used in most of these cases. The subperitoneal splanchnic method is employed.

Catgut is used in mucous membranes but seldom in other tissues. Silk is used almost everywhere. It is cheap, easily handled on spools, and easily sterilized. In a gastrectomy case, 550 to 100 silk ligatures are used. This does not, of course, appeal to most American surgeons.

The eye, ear, nose, and throat classes are always large and excellent work can be had in these departments. Genitourinary diseases, X ray, pediatrics, gynecology and obstetrics, mental and nervous diseases, and orthopedics all have places on the lists of courses available to members of the American Medical Association of Vienna.

The cost to each individual is determined by the number taking the course. Courses vary in price. The fee is definitely fixed by the association. The fee for operative surgery with individual instruction varies from \$3 to \$5 per hour. Where several are working together in a course or in any lecture work the fee is divided by the number of members. This makes some lecture courses very reasonable indeed. Cadaver work is \$3 per hour plus the cadaver fee of about 30 cents. The instructors are excellent teachers and are always willing to give special attention to any subject in which one may be particularly interested. They are especially equipped to teach gross and microscopical pathology, operative surgery, eye, ear, nose, and throat, X ray, and orthopedics.

The cost of living in Vienna is about two-thirds as high as it is in the large cities of the United States. Pension accommodations are not, as a rule, very satisfactory. Fairly good hotel accommodations can readily be obtained.

Vienna is still a great medical center and draws the most interesting cases from all parts of continental Europe. The war has retarded new construction in the hospitals, but the work itself goes on with the same activity as it did in pre-war times.

Following is a summary of the most interesting autopsies seen during the course of a month, from which some idea may be gleaned of the amount of work done.

Case I.—Thrombosis of spermatic and prostatic veins with an embolus lodging in the pulmonary artery resulting in death.

Case II.—Cerebellar tumor. Operated. Glioma. It was found to be too extensive for removal. The case had developed a trigeminal palsy on one side and a paralysis of the abducens. Death

resulted from the compression of the medulla into the foramen magnum. At autopsy it was found that the pressure from the growing tumor pinched and then cut off the nerve against the dura where the nerve pierces it beneath the attachment of the tentorium to the petrous part of the temporal bone.

Case III.—Paranoia. There were discovered at autopsy about 100 polyps in the stomach. Doctor Erdheim has seen as many as 300 in a case.

Case IV.—Two very large gliomas of the left hemisphere were found. The rarity of the case was emphasized.

Case V.—History of metritis and parametritis which caused bilateral thrombosis of the veins and a left femoral vein thrombosis. Death was due to several emboli in the lungs.

Case VI.—A history of osteomyelitis at 10 years of age with apparent cure. At 32 the osteomyelitis reappeared and the laboratory found the same organism present—the staphylococcus. Doctor Erdheim believed this organism can live and lie dormant many years, as was illustrated by this case.

Case VII.—Ulcer, secondary to gastroenterostomy. The secondary ulcer pierced the jejunum and transverse colon, which latter had become adherent to the jejunum at the site of irritation of the ulcer. This ulceration found a direct tract from the stomach to the transverse colon. There was also an ulcer in the duodenum penetrating the substance of the pancreas. About two years ago a similar case was received on the surgical service of the Philadelphia Naval Hospital. In this instance the patient, a veteran, vomited a rectal injection, which was made for the purpose of X-ray study, a few minutes after it was given. The fluoroscope revealed the fact that food passed from the stomach directly into the transverse colon. He had had a gastroenterostomy some years previously, and it was thought at first that at that time an opening was made between the stomach and transverse colon. However, his distress and loss in weight and strength had been marked only recently. No doubt it was a case of secondary ulceration.

Case VIII.—Hernia of stomach through diaphragm. This was mistaken for a case of pleurisy and was tapped. The needle withdrew fluid from the stomach. The case died of peritonitis.

Case IX.—Infarcts in the lungs due to emboli from a thrombosed femoral vein.

Case X.—Several cases of infarcts in the lungs in pneumonia and pleurisy.

Case XI.—Carcinoma of the cervix, with extension to the rectum and bladder. Both ureters were constricted at the bladder, due to the tumor growth. This caused hydronephrosis bilaterally and

hydroureters. The latter measured from 1 to 2½ centimeters in diameter.

Case XII.—Carcinoma of uterus, fundus. Operated upon in 1922. Supravaginal hysterectomy. Died in 1923, due to metastasis in the bladder, causing hydronephrosis and hydroureters similar to the case above. Metastases were also found in the kidneys, cecum, liver, spleen, lungs, pericardium and heart, spinal meninges, and vertebrae. This case serves to demonstrate the thoroughness of the autopsy work done at this clinic.

Case XIII.—Carcinoma of rectum: Kraske operation performed. Later metastasis formed in the bladder. An ascending infection resulted in bilateral pyelonephritis, causing death.

Case XIV.—Carcinoma, infiltrating, fundus of stomach. Death from pulmonary embolus. This type of carcinoma is not frequently met with. In general appearance it is quite different from the usual malignant gastric tumor. The entire fundus was involved. The stomach wall was at least three times its normal thickness. The submucosa and muscularis were markedly thickened. The mucosa was quite thick and could not be lifted up readily. Everywhere it was infiltrated.

Case XV.—Carcinoma of ovary, with metastases in the mesentery, on the under side of the diaphragm, and on the upper side of the diaphragm, involving the pleura.

Case XVI.—Carcinoma of the breast, with metastases to the sternum and proximal end of humerus, and a fracture of the femur, due to metastasis. In addition, this case had metastases in the ribs and spine, the latter causing kyphosis. A teratoma of the right ovary was present.

Case XVII.—Carcinoma with large metastasis on the jugular vein and artery.

Case XVIII.—Bilateral carcinoma of the parotid. Death due to pneumonia. Metastatic growths were present on the inner surface of the dura. The primary tumor was in the oesophagus, but as it was quite small the patient had had no symptoms from it.

Case XIX.—Carcinoma of rectum without extension to the sacrum. Kraske operation performed. A phlegmonous periintestinal inflammation developed and a pyelitis ensued, causing death.

Case XX.—Carcinoma of the thyroid gland following a carcinoma of the breast, which had been operated upon some years before.

Case XXI.—Carcinoma of the uterus, with vesical fistula and obliteration of the intramural part of the left ureter, with resulting left hydronephrosis.

Case XXII.—Carcinoma of the mammary gland, with metastasis in the spine. Death due to pneumonia. The spinal metastasis had

grown into two discs and the bodies of two vertebrae had been destroyed. It had also infiltrated between the canal and the cord, yet pressure had not been sufficient to cause spinal symptoms. This case illustrates the extent to which carcinoma may grow without giving symptoms.

Case XXIII.—Carcinoma of the breast: Operated. At autopsy (one year later) carcinoma of the left pleura, the pericardium, and mediastinal glands was found. There was retraction of the left lung to the hilus. The pleura had the appearance of thickening, due to chronic pleurisy. This was really carcinoma. Metastatic growths were found in the head of the femur, the sternum, the liver, and scattered throughout the entire spinal column. There was a thrombosis of the inferior vena cava.

Case XXIV.—Carcinoma of larynx. Inoperable owing to its size and due to the fact that it involved the larynx and upper half of the trachea, destroying all rings and breaking through into the oesophagus. Metastases were found in the mediastinum and liver.

Case XXV.—Carcinoma at base of skull, involving the dura with metastases about the cord.

Case XXVI.—Nephrolithiasis and impacted feces. Impaction caused dilation and ulceration of the rectum and sigmoid and thrombosis of the hemorrhoidal veins and even thrombosis of the hypogastric vein and inferior vena cava, resulting in death. This demonstrates the really serious consequences that may result from impaction.

Case XXVII.—Carcinoma of the lung with metastasis in the left frontal lobe of the brain (silent area) surrounded by edema. There had been no symptoms, but the edema surrounding the growth caused death.

Case XXVIII. Carcinoma of the uterus. Removal four years ago. Metastasis of the left ureter caused hydronephrosis. Cystitis developed and an ascending infection ensued on the right side. Abscessed right kidney caused death.

Case XXIX.—Carcinoma, posterior nasal pharynx with extension into perilymphatics and metastases into cavernous sinus. The latter was plugged full of carcinoma. The metastases in the skull were scattered throughout. There were also several in the liver 1 inch in diameter each. The destruction caused by the primary growth allowed an infection to enter the meninges.

These cases indicate the caliber of the work done. Time is well spent in the clinics of Vienna.

MORALE AND MEDICAL CARE OF DEPENDENTS

By L. H. WILLIAMS, Lieutenant Commander, Medical Corps, United States Navy

The medical officer is a predominant factor in the making and maintenance of morale in military organizations. By the elimination at preliminary examination of men physically and mentally unfit for military service he prepares the way for reasonable contentment under the stress of camp and ship life and the strain of battle. Modern war can not be fought without his aid; the casualties are too numerous; the ravages of disease too destructive, unless held in check by medical science. In war the duties of medical officers are rigidly prescribed. Their full energy and time is required to fulfill their obligations; often their lives as well.

In peace the part played by medical officers of the armed forces of this country acquires a broader latitude. No national emergency exacts all of their energy and thought. There is opportunity for medical research. Little-known diseases of far countries can be studied. Special courses at the best medical centers may be pursued by those specially qualified and at Government expense. The past century is replete with discoveries made by medical officers of this country and of the civilized world that are of paramount importance to human life and industry.

Laveran, the Frenchman, discoverer of the malaria parasite; Leishman, Munson, and Ross, Englishmen, who disclosed the organisms of many tropical diseases; Reed and his coworkers, discoverers of the carrier of yellow fever; Gorgas, the sanitary engineer, who made possible the building of the Panama Canal; and Stitt, who, by his studies and books, has placed tropical medicine within the grasp of the ordinary doctor, are great names in the annals of military medicine. These men have demonstrated by their accomplishments that the uniform is no bar to the serving of humanity outside the rank and file of a military organization. Rather are they honored because of the unrequired, the self-imposed tasks which they assumed and so splendidly carried out.

The morale of war and the morale of peace have one fundamental in common—patriotism. In war, love of country demands sacrifice to the limit of life itself, if need be; in peace, it requires sacrifice of personal desires to the common interest and that of one's family. Patriotism has its root in love of family. During the intervals of peace the fire of patriotism smolders close to the roots. The interest of family attain a large place and must be ministered to within reason if the morale of the soldier and sailor is to be maintained.

In time of war the clarion call of cause urges men on. The morale of peace stands or falls in the clear light of reason. Emotion

plays an almost negligible part. Men have leisure to think of their future, for in peace a future may be reasonably expected. The financial aspect of military service is weighed carefully. Service away from one's family is doubly irksome. A family costs money, a lot of money in various ways. Enlisted men do not receive much money; officers receive scarcely more in proportion to their responsibilities. The budgets of neither officers nor men can, to-day, allow for a major surgical operation at the usual charges without serious disruption.

This situation is the result of the advance in the cost of medical and surgical care of recent years in keeping with the general advance in prices and wages of civil life. The pay of the services, though recently raised, has not been increased in proportion to the advance in wages and profits among the civilian population.

Since this change in civil life has been exerting its influence the Naval Establishment has endeavored in many ways to maintain a high state of morale in its commissioned and enlisted personnel. Much money is being spent for entertainment afloat and ashore. A Division of Morale has been established in the Bureau of Navigation. A liberal retirement after 16 and 20 years' service has been provided for enlisted men. Yet these skilled men, because of their families, are constantly leaving the service by retirement and otherwise. They are reluctant to leave the service, but they are unwilling to leave their dependents for many months, to be separated by thousands of miles from them, without more assurance than they have at present of their dependents' continued welfare.

It is believed no human agency can serve to develop the requisite confidence in the minds of these husbands and fathers of their families' well-being during their absence, as well as adequate and sympathetic medical care. The assurance to these men that they could expect their dependents to be carefully and skillfully attended during their absence on long cruises would be of immense value in maintaining their morale.

The loyalty and efficiency of employees of some large industrial companies which provide adequate medical care of families is a striking example of the value of this service. The labor turnovers in these companies are negligible, while their waiting lists are enormous.

The medical care of dependents of the active and retired personnel of the Navy has been undertaken officially and unofficially for many years. Yet it has been considered, with some noteworthy exceptions, as an extra duty and more or less begrudgingly performed. Its bearing on morale has never been fully emphasized. This failure can not be laid at the door of any particular individual or corps. A decade ago it could not have been adequately carried out. The

qualified surgeons and specialists were too few and too scattered, besides being fully occupied with official duties.

The special courses in the various branches of medicine and surgery now available to medical and dental officers of the Navy at the best medical centers and the opening of naval hospitals to veterans of the World War have given a new vision to those officers fortunate enough to have been attached to these institutions. The opportunity for study and service has resulted in a quickening of their perceptions, a revival of their professional interest, and in exercise of their technical ability.

The senior medical officer of the naval operating base, Hampton Roads, Va., has fostered the medical care of naval dependents to the limit of his ability, consistent with the Naval Regulations and established customs. In this he has been encouraged and supported by the commandant of the fifth naval district. A medical officer has been detailed to this duty at the naval operating base for the past four years. Under the authority of the commandant instructions were promulgated for the guidance of this medical officer and for the people benefited by this activity. Transportation and a hospital corpsman were detailed for the exclusive use of the visiting medical officer. The car was furnished by the morale division of the naval training station. An average of 1,400 miles a month is covered in making calls. No restriction as to distance is made in cases of necessity. An area of a half circle, some 8 miles in radius, is covered. In 1924 calls to homes averaged seven per day. The office calls were slightly more numerous. Forty-one major operations were performed in 1924. The care of obstetrical cases is restricted to people living on the Base. Four confinements were taken care of in 1924. There are some 600 families in the purview of the visiting medical officer. Their cooperation in the matter of calls for trivial illness is essential, and on the whole excellent.

The naval hospital, Norfolk, Va., is exceedingly helpful in affording the services of specialists. No pains, time, or money is spared when necessary to solve the problem of disease at hand.

Close cooperation on the part of the visiting medical officer with the president of the Navy Relief Society of this district is maintained. This is the means of avoiding much unnecessary worry and suffering, with consequent loss of morale in the individuals concerned.

A comparatively novel extension of medical care of dependents is the airplane ambulance service now afforded the United States Coast Guard and naval dependents in the isolated districts along the North Carolina and Virginia coasts. Calls for assistance from these localities are answered by ambulance plane. A medical officer frequently goes in the plane. Recently a woman believed to have

placenta previa was transferred in labor to Norfolk, Va., by ambulance plane and delivered in a local hospital.

The medical care given dependents at the naval base, Hampton Roads, Va., is at present only a beginning of what may be accomplished in this field. Hospitalization of dependents in naval hospitals is still withheld. The presence of veterans in these institutions has served to partly open their doors. So far the effect has been merely that of a toe in the crack. The sooner hospitalization can be allowed the better for the morale of the rank and file. The cost will be negligible, because the service will pay for itself in many ways.

It is the nature of men to live where they can procure food and protection with the minimum of effort. The growth and prosperity of cities are age-old illustration of this tendency. The efficiency and loyalty of the employees of certain industrial companies, which afford adequate medical care of the families of their employees, are examples of its economic value.

When adequate medical care is afforded dependents of the naval personnel, centers of naval population will tend to form where naval families can be reached by this service. There will be more unity of social life as a result of proximity and more contentment.

The problem of adequate medical care of naval dependents confronts the doctors and dentists composing the Medical Corps of the Navy. It demands solution. The Medical Corps can not unaided overcome the difficulties it now encounters in providing adequate care for naval dependents. Though the spirit be willing the flesh is weak. It must be assisted in the way of transportation, offices, and hospital facilities. The Navy Relief Society and the Morale Division of the Bureau of Navigation can greatly increase their sphere of usefulness in providing these necessary aids. With earnest cooperation on the part of all concerned, in proportion to their authority and resources, it is believed, this much needed service can be supplied with great benefit to the Navy.

CLINICAL NOTES

CORONARY OCCLUSION—REPORT OF CASES

By G. F. CLARK, Lieutenant Commander, Medical Corps, United States Navy

Coronary occlusion has long been recognized as a cause of angina pectoris, but it is only in recent years that the diagnosis of coronary occlusion could be made with reasonable certainty, before death, by clinical signs and symptoms.

Of importance in diagnosis are:

(a) Anginal pain, which persists longer than the ordinary attack of angina pectoris, lasting from one to several hours, sometimes spoken of as *status anginosus*; not relieved by inhalations of amyl nitrite and at times but slightly by morphine. The pain may involve the upper abdomen and so be confused with an acute surgical condition.

(b) Pericardial friction rub, which may be heard over a limited area and may disappear quickly.

(c) Fall in blood pressure, sometimes gradual, over a period of 48 to 96 hours after the attack; sometimes after a shorter interval and more abruptly. When present, it is usually well marked—a drop of 40 or more millimeters of mercury for the systolic pressure, but not a proportionate drop in the diastolic, so that there is a much smaller pulse pressure than usual for the individual.

The fall in blood pressure does not occur when the right ventricle is involved alone, but in such cases one may expect evidence of disturbances in the pulmonary circulation, such as pulmonary edema or pulmonary infarction.

(d) Fever of moderate degree—99.6° to 101°, sometimes higher.

(e) Leucocytosis, usually not higher than 20,000 per cubic millimeter.

(f) Inversion of the T waves in the electrocardiogram.

(g) Many other symptoms which are less constantly to be relied upon for diagnosis are: Dyspnea; nausea; vomiting; sweating; cough; cyanosis or ashy pallor; irregular heart action, due to extrasystoles or auricular fibrillation. Gallop rhythm or other cardiac manifestations may occur.

In the past 18 months there have been three cases of coronary occlusion at the United States Naval Hospital, Washington, D. C.

One case has clinically recovered and is carrying on his routine duties; a second has partially recovered so as to be up in a wheel chair; while the third was noted at autopsy after sudden death.

The histories and findings are briefly as follows:

CASE A

Age, 65. Admitted February 27, 1924.

Chief complaint.—Soreness in epigastrium. While walking from the Navy Department to his home, a distance of about 2 miles, he had an urgent desire to go to stool and hastened home. He passed a very copious stool and shortly afterwards had a sense of constriction across the chest, with slight numbness in each little finger. He had discomfort, but not agonizing pain, for about one hour, relieved by a hypodermic of morphine.

Previous illness.—Childhood diseases only.

Family history.—Excellent.

Habits.—Smokes a pipe, one-half ounce daily, and drinks three cups of coffee daily.

Physical examination.—Height, 5 feet 6 inches. Weight, 165. Skin, lymphatics, eyes, and nose presented nothing unusual. Hearing somewhat impaired. Teeth, some pyorrhœa; throat, red; tonsils, submerged. *Neck:* Short and thick; pulsation in episternal notch. *Chest:* Somewhat emphysematous; expansion fair. Lungs, clear. *Heart:* Maximum impulse not seen or felt; sounds irregular, due to extrasystoles—one in four to six beats. At the aortic area there was a rough, systolic murmur transmitted into the neck and also heard over entire precordium; A, absent; pulses, 80, synchronous. Blood pressure, S—164, D—90. *Abdomen:* Negative, except that the liver was palpable, about 1 inch below costal margin. Genitals normal. No hemorrhoids or fissures. Extremities negative.

Treatment.—Rest in bed; 1,500 cubic centimeters of milk per day; no other fluids. Stop smoking. T., 100°–101°. P., 80–100. R., 20–25. W. B. Count, 17,000. Polymorphonuclears, 78 per cent; lymphocytes, 20 per cent; large mononuclears, 2 per cent. Within 48 hours of the attack the blood pressure had fallen to S—114, D—86, and two days later to S—100, D—68. X ray showed the heart to be rather broad transversely and the aorta to be somewhat increased in width; lung fields, clear. Electrocardiogram showed T1 to be inverted, T2 diphasic, and T3 upright, with ventricular premature beats. For several days, T., 99°–100°; P., 60–90; R., 18–20. Within 10 days white blood count, 8,850. Blood pressure, S—128, D—80.

After two weeks the patient sat up for 15 minutes daily and blood pressure increased to S—180, D—80.

This case has been observed repeatedly. Six electrocardiograms have been taken. Extrasystoles have been noted at each examination except the last, which was on May 27, 1925. The blood pressure then was S—158, D—70; murmur unchanged, but A, was heard as a faint click. His weight was gradually reduced by diet to 150 pounds, which he has maintained for some months. He can walk 2 miles without undue fatigue. This case shows clinical recovery, although the last electrocardiogram shows, as did all others, T1 inverted and T2 diphasic.

CASE B

Age, 49 years. Admitted April 25, 1925.

Chief complaint.—Pain in chest and back.

Present illness.—About 40 hours before admission, while in bed, patient had very severe pain in upper thorax and down both arms, which continued for 4 hours; was not relieved by amyl nitrite inhalations nor by three-fourths of a grain of morphine by hypodermic. The pain is still present but not so acute as it was in the attack.

Previous illness.—Diseases of childhood; sinusitis of antrum with otitis media and involvement of mastoid; influenza; in 1921 first noted pain in chest, which was relieved by throwing himself face downward on the bed and then turning over on the back—diagnosed as neurasthenia.

Family history.—Father and mother both died of heart disease—otherwise negative.

Physical examination.—Skin, lymphatics, eyes, ears, mouth, and teeth presented nothing unusual. Tonsils submerged; very little tissue. *Neck:* Pulsation felt in episternal notch. *Chest:* Deep breath caused some pain. Lungs clear. Aorta seems wide on percussion; sounds regular, distant at apex, A₂ accentuated. Systolic murmur at aortic area. Blood pressure: S—138, D—94. Abdomen, genitals, and extremities presented nothing unusual. White blood count, 18,200, with 79 per cent polys. T., 100.6–101.6; P., 84–96; R., 20–22.

Treatment.—Rest in bed; fluids restricted to 1,000 cubic centimeters of milk daily. Bromides; s. s. enema.

This patient had been examined one year before admission and on two other occasions within the year before admission, when the blood pressure had been recorded as S—140, D—90. His attacks of pain from time to time within the year, were believed due to aortitis, X ray having shown a widening of the great vessels. Wassermann tests, negative. Within 24 hours after admission the blood pressure dropped to S—108, D—80, and within five days had become S—96, D—82.

Temperature continued for eight days up to 100.6.

Fluids were gradually increased after 48 hours and additional diet given.

On May 25, 1925, an electrocardiogram was taken, and it showed characteristic inversion of T waves, with a rounding of shoulder. The blood pressure remained low for six weeks, when digitals, in doses of gr. 1½ of the leaves, daily, was started. The blood pressure has slowly risen to S—124, D—80, almost three months after the severe attack.

For the past five weeks patient has been allowed up in a wheel chair for increasing periods of time, until he has been able to be up an hour, twice daily, without fatigue.

SUMMARY

Both of these patients had attacks of pain in the upper thorax, radiating down the arms; temperature elevation for several days after their attacks; leucocytosis with increase of polymorphonuclears; decided fall in blood pressure within 48 to 72 hours of the attack; electrocardiograms showed inverted or diphasic T waves in two of the three leads.

It is not believed that the fall in blood pressure to a subnormal level was due to rest in bed and limitation of diet. Coronary occlu-

sion, involving the right side of the heart, would not cause such a fall in blood pressure.

CASE C

On May 29, 1925, the body of an aviator, who had died suddenly shortly after making a successful landing in his plane, was brought to the hospital for examination. Carbon-monoxide poisoning from motor-exhaust gases had been considered as a possible cause of death.

Autopsy report.—The body is that of a well developed and nourished man, apparently 30 years of age. Slight rigor mortis present. Suggulation about the ears, neck, and dependent portions. Very slight abrasion along the costal margin, which is stated by Lieutenant Fish (Medical Corps), United States Navy, to be due to artificial-respiration method. No evidence of fracture or other injury. Usual incision from episternal notch to pubes. Subcutaneous tissue and muscles of normal color.

There were no adhesions about either lung or in the peritoneal cavity; no fluid noted. Lungs, liver, spleen, intestines, and kidneys apparently normal, except for congestion of liver. The brain was removed. Scalp showed some adhesions, and dura was adherent in patches. On either side of the longitudinal sinus, near the fissure of Rolando, there were some small white macules about the size of a pin's head, or less, in diameter. Longitudinal incisions opening into the lateral ventricles and into the medulla did not show any gross changes. The pericardium was opened, and there was a moderate amount of straw-colored fluid noted. The left ventricle showed two irregular bluish patches.

On cutting into the left ventricle about one-half of it, toward the apex, was found to be thin and less firm than the muscle of the upper portion of the ventricle. A part of the thinned-out portion seemed infiltrated with old blood, giving a very dark red color. Blood examined for carbon monoxide and found negative.

June 3, 1925: Coronary arteries dissected out, and the terminal branch of the right coronary was found to contain a recent thrombus. The descending branch of the left coronary contained an older thrombus. The coronary arteries showed thickening in patches. Noguchi, Kolmer, and Kahn tests, on blood collected at autopsy about six hours after death, were all negative.

The friends of the aviator state that he had an attack of acute indigestion two weeks before death.

Sections made at the junction of the apparently normal and degenerated tissue were examined, microscopically, and confirmed the microscopic findings.

Special staining of heart and aorta for spirochetes—negative.

Case "C" is of unusual interest because the man was only 30 years of age and no specific findings were obtained by careful search.

TREATMENT

Absolute rest in bed; limitation of fluid to 1,000 c. c. of milk for the first few days, and then increase diet by readily digestible foods and a slow increase in fluids; regulate the bowels by sodium phosphate or a mild laxative; bromides for insomnia or restlessness. If the blood pressure shows no indication of increasing, digitalis may

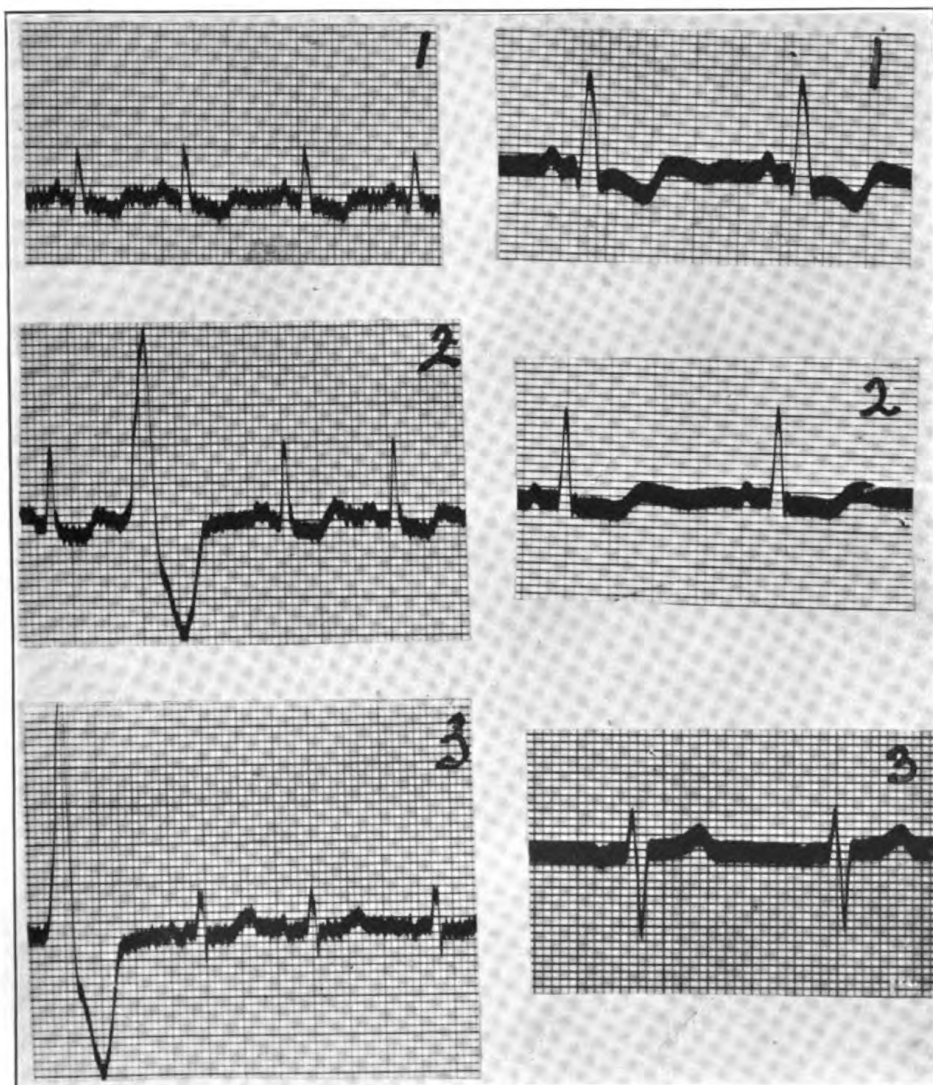


FIG. 1.—CASE A.—COLUMN ON LEFT SHOWS LEADS I, II, AND III, TAKEN SHORTLY AFTER ADMISSION. T 1, INVERTED; T 2, DIPHASIC; T 3, UPRIGHT; VENTRICULAR PREMATURE BEATS IN LEADS II AND III; SOMATIC TREMOR. COLUMN ON RIGHT SHOWS LEADS I, II, AND III, TAKEN JUNE 3, 1925. T 1, INVERTED; T 2, DIPHASIC; T 3, UPRIGHT; NO PREMATURE BEATS; NO SOMATIC TREMOR

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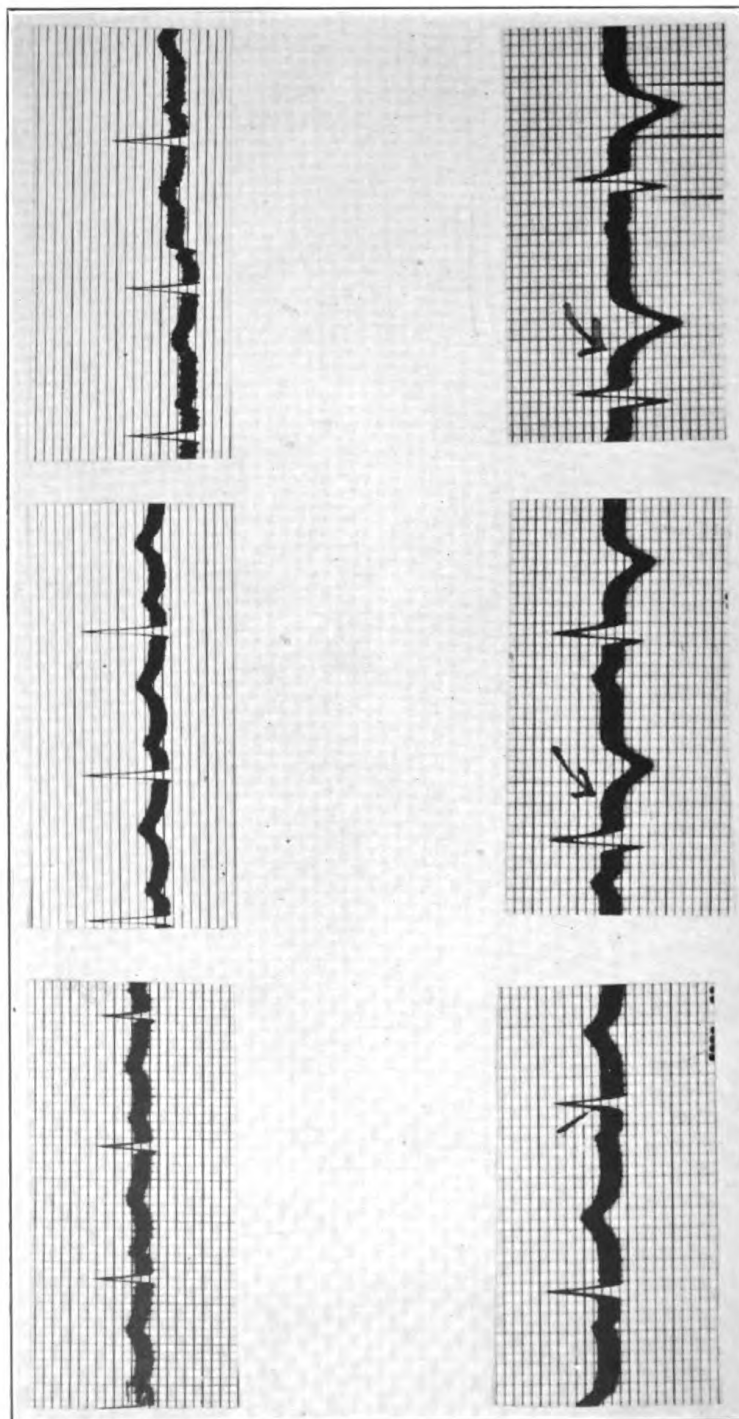


FIG. 2.—CASE 3.—UPPER ROW SHOWS LEADS I, II, AND III, TAKEN MAY 2, 1924, ABOUT ONE YEAR PRIOR TO ANGINA-LIKE ATTACK. TIME MARKER FAILED TO REGISTER IN LEADS I AND II. NEGATIVE TRACING, LOWER ROW SHOWS INVERSION OF THE T WAVES IN LEADS II AND III, WITH ROUNDING OF THE "SHOULDER"

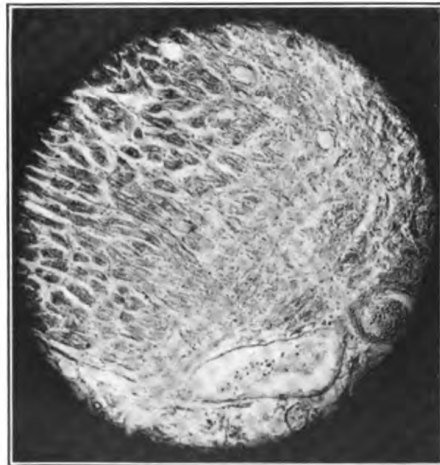


FIG. 3.—CASE C.—SECTION FROM JUNCTION OF NORMAL AND DEGENERATED TISSUE IN WALL OF LEFT VENTRICLE, SHOWING MARKED FIBROSIS

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be used in small doses, some weeks after the attack. The heart sounds being good, the lungs clear, absence of edema or engorgement of the liver, and the blood pressure increasing, are indications for permitting the patient to sit up for a few minutes. If no symptoms arise, the periods may be gradually lengthened.

My thanks are due to Dr. Paul D. White, Massachusetts General Hospital, Boston, Mass., who has read the record of two of the cases; to Dr. Thomas S. Lee, Washington, D. C., who has seen one of the cases, in consultation, from time to time; and to Lieut. F. C. Hill, Medical Corps, United States Navy, who interpreted the electrocardiographic records.

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DEEP THERAPY TREATMENT OF INTRATHORACIC NEOPLASMS

PRELIMINARY REPORT OF TWO CASES

By J. W. SMITH, Lieutenant, Medical Corps, United States Navy

These cases have responded so readily to short wave-length therapy and illustrate the value of this form of treatment so well that it is believed a preliminary report will be of interest.

CASE 1

R. E. M., age 29, admitted to the United States Naval Hospital, Chelsea, Mass., on April 4, 1925, from the United States Veterans' Bureau for observation and treatment. Family history, unimportant. He had the usual diseases of childhood; appendectomy in 1921; tonsillectomy in 1922; pleurisy and pneumonia in 1924. At the time of admission his chief complaint was a dry irritating cough and continuous dull pain between the scapulae, general weakness, and a loss of 30 pounds in weight.

Physical examination.—The patient is well developed and nourished. Eyes, ears, and nose, negative. Mucous membrane of mouth and throat of good color. Teeth in good repair. Uvula absent. No glandular enlargement. Cardiac dullness increased to the left. Apex beat is not seen but is best heard in the fifth interspace, the sounds being distant but of good quality.

No murmurs. Chest expansion full and equal. Breath sounds harsh at angle of left scapula, no râles heard. Resonance impaired in upper third of left axilla. Abdomen, genitalia, and extremities are negative.

Laboratory findings.—Urinalysis normal; white-blood count, 10,000; polymorphonuclears, 75 per cent; lymphocytes, 24 per cent; eosinophiles, 1 per cent. Sputum negative for tubercle bacilli.

On April 15, 1925, Roentgen-ray examination showed a dense shadow in the mid portion of the left-lung field. On April 23, 1925, the consultant for the Veterans' Bureau made the following report: "The history suggests an old lung abscess. The physical signs and roentgenogram would rather point that this abscess is located in the mediastinum." On April 25, 1925, a surgical consultant made the following report: "Probably an old lung abscess; drainage is recommended." Operation was not attempted, because soon after this date the patient began to improve. He was allowed to be up and about the ward.

On May 6, 1925, red-blood count was 4,700,000; white-blood count, 6,000; hemoglobin, 80 per cent; polymorphonuclears, 63 per cent; lymphocytes, 37 per cent.

On May 30, 1925, I saw the case and made the following report on the roentgenograms: "There is an area of increased density in the mid portion of the left-lung field. This area has a rather smooth and distinct lateral border. Neoplasm should be considered in this case. If symptoms point to this condition, I would recommend deep Roentgen-ray therapy."

On June 1, 1925, patient complained of pain in the back, headache, and inability to sleep. His temperature at this time was 103°. This condition soon subsided and was followed by marked improvement and he was allowed to go out on liberty. On June 23, 1925, he began to complain of considerable pain over precordia. Examination revealed bulging in second and third interspaces, left chest, anteriorly. His voices became husky, and he developed a brassy cough. Of course aneurysm was considered at this time. On June 26, 1925, Roentgenogram showed marked increase of size and density of area previously described; also a small amount of fluid in the left pleural cavity. Paracentesis made into the left pleural cavity removed 20 cubic centimeters of bile-colored, transparent fluid in which no organisms could be demonstrated. Culture in 48 hours showed *Staphylococcus albus*. This was considered to be contamination.

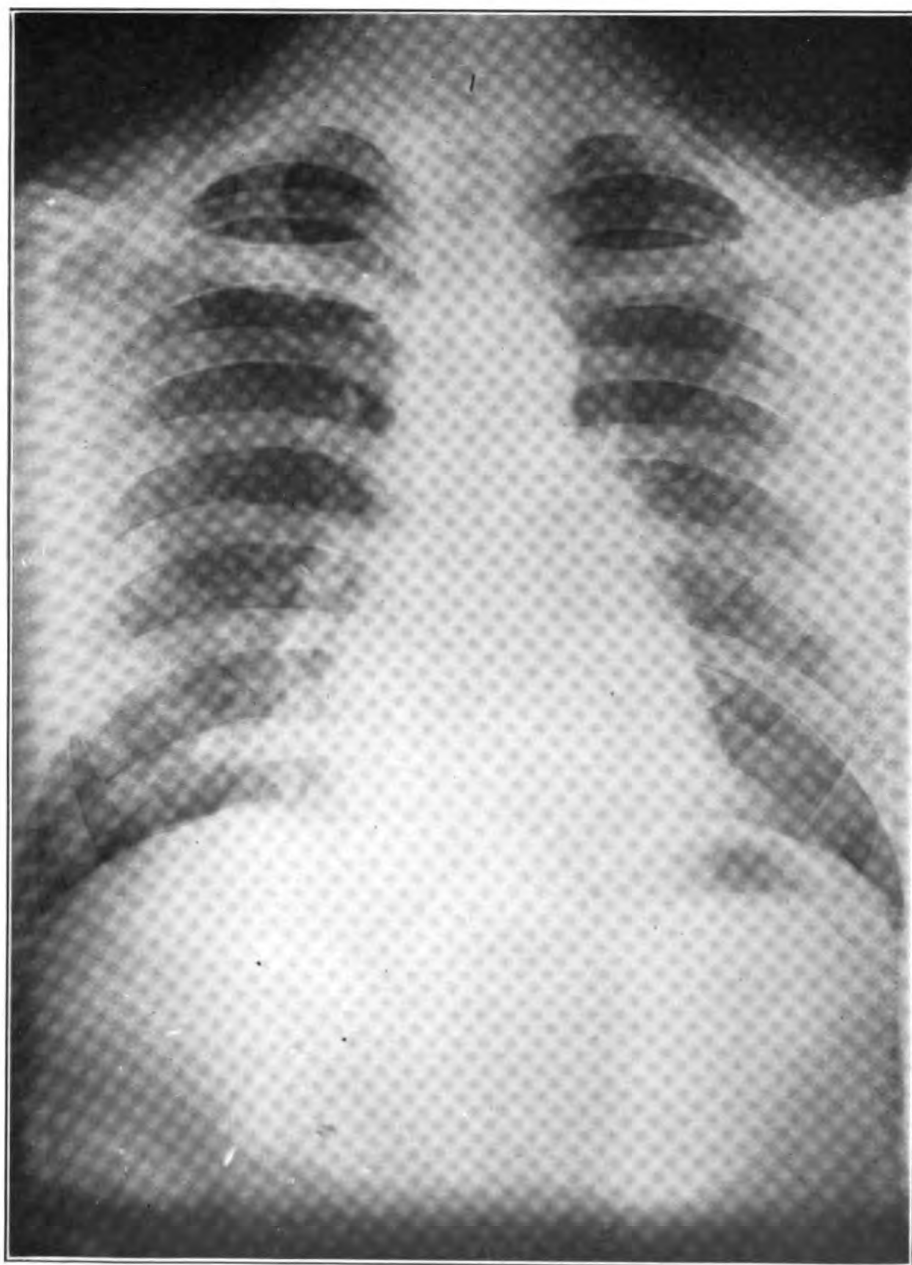
On July 1, 1925, roentgenograms showed the mass in the chest to have increased in size and density, but there was no evidence of fluid. (Fig. 1.)

Mediastinal abscess and aneurysm were still considered but neoplasm could not be ruled out. Therefore a tentative diagnosis of tumor, probably lymphosarcoma, was made and the chief of the surgical department was agreeable to the application of deep Roentgen-ray therapy.

Beginning July 9, 1925, deep Roentgen-ray therapy was given in divided doses, alternating front and back. Patient began to improve in every way and he was considered to have recovered sufficiently to permit of his discharge from the hospital August 13, 1925, to return in six weeks for another series of treatments.

Roentgenogram was made on day patient left the hospital. (Fig. 2.)

When this patient was seen about 10 days ago, he was still hoarse but had no cough and had gained 30 pounds.



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FIG. 1.—CASE 1, JULY 1, 1925

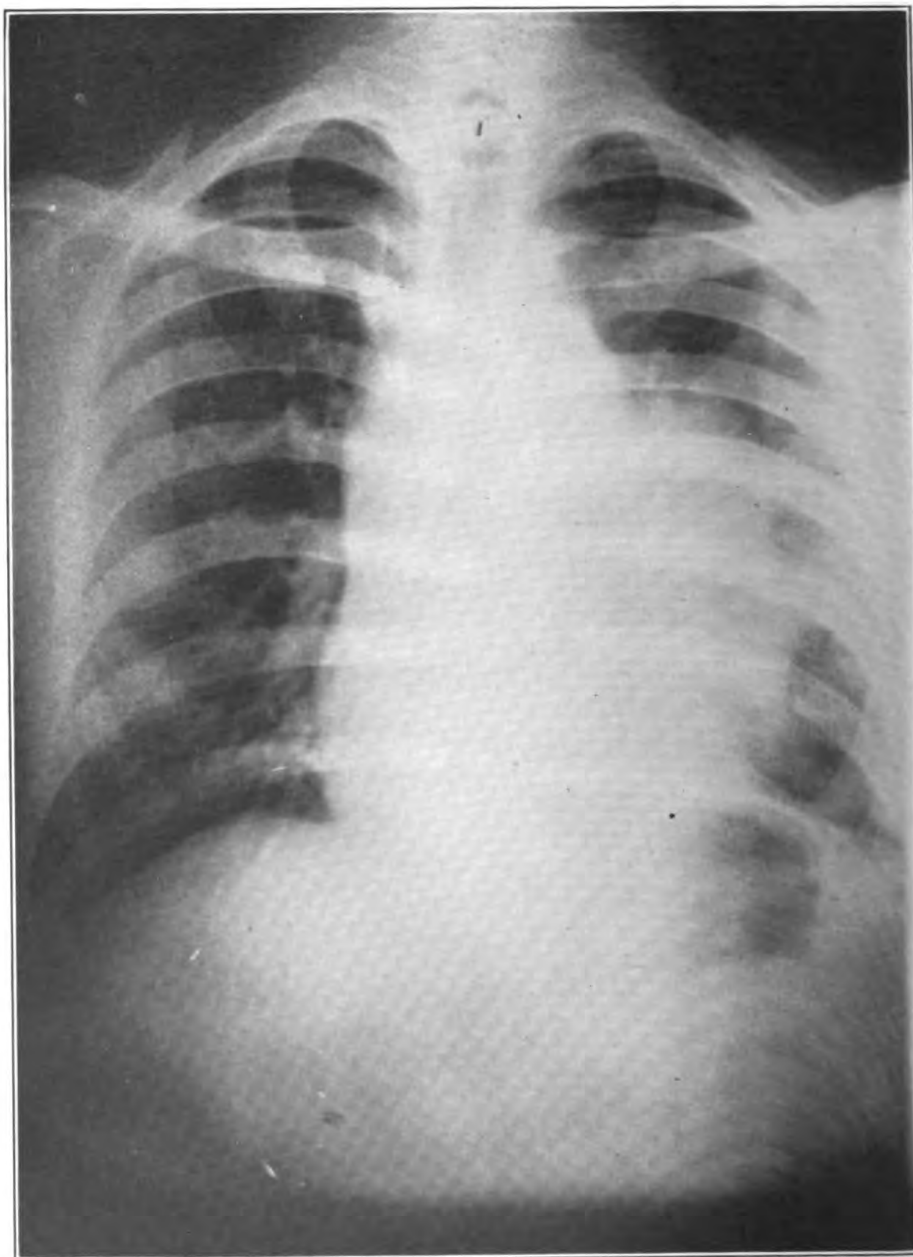


FIG. 2.—CASE 1, AUGUST 13, 1925

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FIG. 3.—CASE 2, JULY 31, 1925

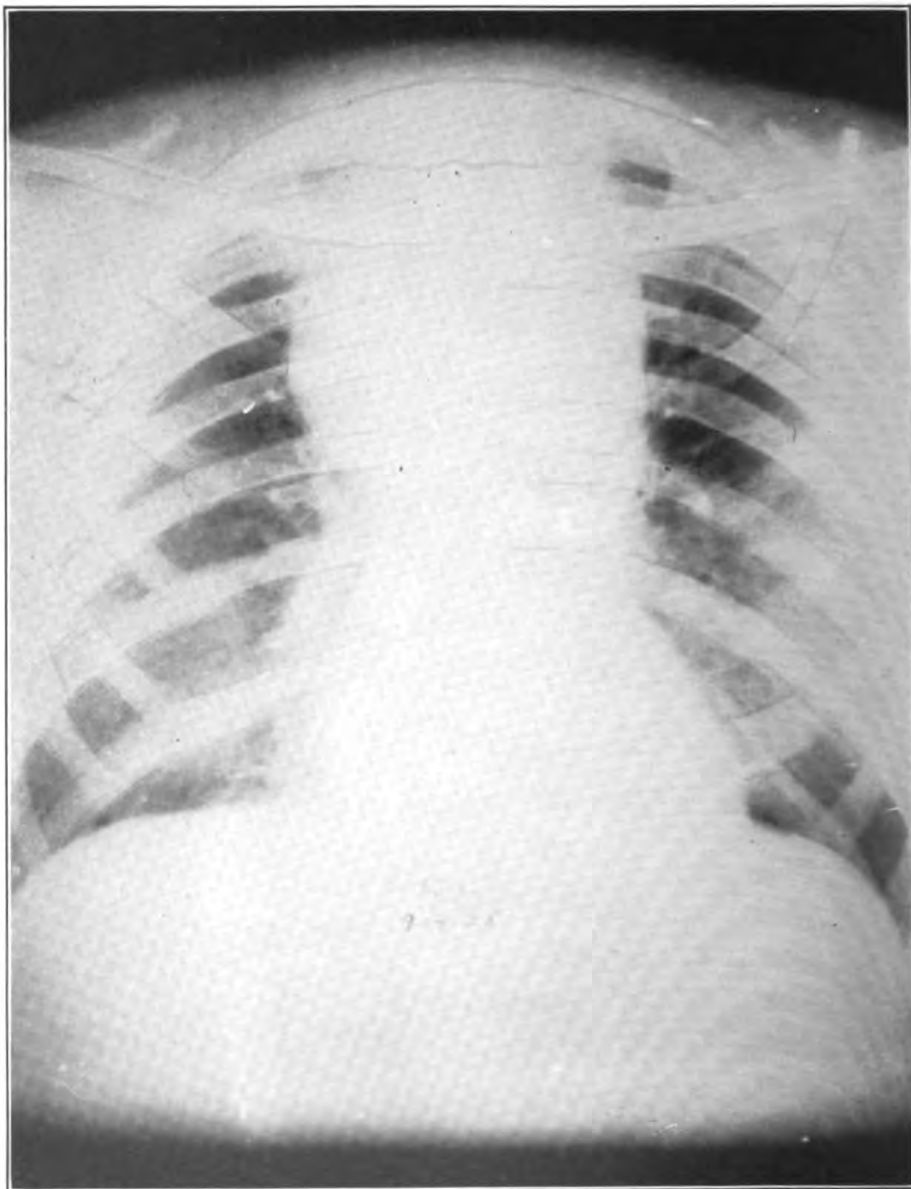


FIG. 4.—CASE 2, SEPTEMBER 4, 1925

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CASE 2

I. B. K., age 39, admitted to the United States Naval Hospital, Chelsea, Mass., from the United States Veterans' Bureau for observation and treatment of bronchitis, pellagra, and hernia. Chief complaints at this time were weakness, loss of weight (50 pounds), and cough. The cough at all times produced clear, white, frosty material. He had had night sweats and difficulty in sleeping. Family history unimportant. He does not remember having had the diseases of childhood. He is married and has three children, all living and well. His wife has had no miscarriages. Two years ago he had trouble with this teeth and had them all removed. Following this he developed furunculosis on the legs and feet, which did not respond to treatment for about one year. In the fall of 1924 he had influenza and has had a cough ever since, accompanied by a feeling of weakness and loss of weight.

Physical examination.—Well developed but poorly nourished white adult. Skin dry and rough, with some bronzing of the forearms and ankles. He first noticed this bronzing in the spring of 1925. Eyes, ears, nose, and throat negative. Bilateral inguinal, epitrochlear, axillary, and supraclavicular glandular enlargement exists. Chest expansion, equal. *Lungs:* Percussion note flat over triangular area, with base in the mid portion of sternum extending out about 6 centimeters to each side of the mid-sternal line; vocal and tactile fremitus increased over this area. No râles heard. *Heart:* Point of maximum impulse not seen nor felt; apex in fifth interspace 10 centimeters to the left of the mid-sternal line; right border in the fourth interspace 5 centimeters to the right of the mid-sternal line. Sounds faint but clear at the apex and base; no murmurs heard. *Abdomen:* Liver enlarged. No areas of tenderness nor masses, but there is a right inguinal hernia.

Laboratory findings.—Urinalysis showed a trace of albumin. Sputum negative for tubercle bacilli. Blood examination: White blood count, 8,400; red blood count, 3,350,000; hemoglobin, 48 per cent; polymorphonuclears, 62 per cent; lymphocytes, 17 per cent; transitionals, 13 per cent; eosinophiles, 8 per cent.

On July 31, 1925, I made the following report on the roentgenogram: "There is a large, oval, rather dense, opaque mass extending from the mediastinum laterally, more marked on the right side." (Fig. 3.)

A diagnosis of lymphosarcoma was made and, beginning August 1, 1925, the first series of deep Roentgen-ray therapy was given in divided doses front and back over the mass evidenced by the roentgenogram. On August 27 a second series of deep Roentgen-ray therapy was given, also in divided doses, front and back. Complete blood count at this time: White blood count, 6,200; red blood count, 4,150,000; hemoglobin, 65 per cent; polymorphonuclears, 54 per cent; lymphocytes, 36 per cent; eosinophiles, 10 per cent.

Just before this patient was discharged from the hospital, September 4, 1925, the cough had disappeared and he was gaining in weight. He volunteered the information that he had never felt better. A roentgenogram was made at this time. (Fig. 4.)

It is quite unusual to see a tumor of this size that does not cause pain. This patient suffered no pain at any time. At one time, during the first series of treatments, he developed edema of the feet. The urinalysis at this time showed a large amount of albumin and

many red blood cells. After rest in bed for a few days, on a protein-free diet, the urine became free of red blood cells and the edema of the feet soon subsided.

A definite diagnosis as to the nature of the neoplasm was not made in these cases because it was almost impossible to obtain a section for biopsy in the first case, and the chief of the medical department did not deem it necessary in the second case. I am led to believe that the diagnosis of lymphosarcoma or Hodgkin's disease in both cases is the most probable one because of the rapidity with which the apparent tumor masses responded to treatment.

LIVER ABSCESS

REPORT OF FIVE CASES

By A. L. LINDALL, Lieutenant, Medical Corps, United States Navy

Abscess of the liver is not an uncommon malady. Dysentery, caused by *Entamoeba histolytica*, is prevalent in most tropical and subtropical countries (1). Abscess of the liver frequently occurs after an attack of amebic dysentery.

The symptomatology and pathology of this disease have been known for many years. Hippocrates described a method of evacuating an abscess of the liver by caustics. However, our present textbooks are very brief in discussions of abscess of the liver, and the operations described are unsatisfactory. According to statistics the mortality of liver abscess is still high. The main cause of this high mortality is not due so much to the virulence of the *Entamoeba histolytica* as it is to procrastination in using the aspirating needle and delayed surgical interference.

Johnston (2) says: "Treatment should be prompt, bold, and radical; no measure will succeed which does not completely evacuate the abscess cavity and allow free drainage. This can be done with precision and safety only by incision. Aspiration, puncture with trocar, direct puncture with scalpel, opening by caustics, or the thermocautery are uncertain, insufficient, dangerous, and unsurgical and are mentioned only to be condemned."

The operations for liver abscess most commonly described reach the liver by passing through either the pleural or the peritoneal cavities. Although pus from a liver abscess contains few or no pathogenic bacteria, the routes through the pleura or peritoneum are not satisfactory because of the possibility of secondary infection and adhesions. Ochsner and Nather (3) have described a retroperitoneal operation for subphrenic abscess following appendicitis, in

which they resect the twelfth rib and go into the perirenal fat behind the peritoneal cavity. This procedure is an ideal operation for reaching the liver and spaces around it. It is a very simple operation and is accomplished very satisfactorily under local anesthesia. It does not expose the peritoneal cavity to infection, and, being below the diaphragm, a pneumothorax and injury to the diaphragm are obviated. The incision goes through soft tissues, which facilitates drainage and reduces shock.

The following cases are interesting, because while the cause in each case is the same the symptoms and course are entirely different:

Case 1 was recovering from an attack of dysentery, which was probably due to *Entamoeba histolytica*, when he developed vague gastrointestinal symptoms with a mild remittent fever and a slight increase of lymphocytes and eosinophiles. The onset in this case was very gradual.

Case 2 was very acute and fulminating. It appeared very much like a case of lobar pneumonia or diaphragmatic pleurisy. This patient did not report to the sick bay, but was found in his tent in a critical condition. This was probably due to the fact that he wanted to leave on the next transport. The abscess had probably ruptured subdiaphragmatically at the time he was found, and this obscured his diagnosis. His death was due to a profuse hemorrhage from the bowel, which frequently occurs in diseases of the liver, such as cirrhosis, without any ulceration of the mucous membrane of the gastrointestinal tract.

Case 3 had an abscess in the left lobe of the liver, which is uncommon. This condition was also very acute, and there was no history of dysentery until three days prior to the outset.

Case 4 had very few symptoms and ran a mild course. This was a very early case. His stools remained positive for *Entamoeba histolytica* after two courses of emetine hydrochloride.

Case 5 had severe symptoms and was failing rapidly. The clinical picture appeared very much like a case of lobar pneumonia.

REPORT OF CASES

Case No. 1.—A. A. G., private, United States Marine Corps. White. Age, 28. Admitted May 8, 1923, complaining of loss of appetite, loss of weight, and vague gastro-intestinal symptoms. His family history was negative. He had had eight years Army service but no previous tropical duty. He had been in the Tropics 11 months. He was a native of Texas and had had malaria. April 30, 1923, he was discharged from the hospital, when he had apparently recovered from a mild attack of dysentery, during which no amebae were found in his stools. About one week after he returned to duty he began to lose his appetite and had some gastric distress and frequent liquid stools. Four months ago he weighed 162 pounds. His present weight is 141 pounds.

During the four days before admission he felt feverish and had some pain under the right shoulder blade and some vague pain in the epigastrium.

Physical examination was negative except for general abdominal tenderness and slight distention. He also had a maculo-pustular eruption scattered over the flanks and on the back. Temperature, 100.2° Pulse, 100. Respiration, 20. White blood count, 6,800. Red blood count, 3,750,000. Lymp., 46 per cent. Eosin, 2 per cent. Wassermann, negative. Urine, negative. Stools negative for amebae and tubercle bacilli. *May 11*: Temperature, pulse, and respiration normal. General condition, improved. *May 14 to June 18*: Temperature varied from 98° F. to 99° F., with occasional rise to 100°. Pulse, 60 to 90. Patient complained of slight gastric distress and vague abdominal pain. There was a slight general abdominal tenderness and some doughy resistance. Blood culture, negative. Widal, negative in the higher dilutions. Gastrointestinal X-ray series, negative. *June 19 to July 3*: Temperature, 99° F. to 101° F. Pulse, 80 to 90. Respiration, normal. Patient began to complain of pain over the liver area, and there was slight tenderness in the epigastrium. Liver dullness had increased slightly. Fluoroscopy showed diminished excursion of the diaphragm on the right side. There was no irregularity in the outline of the diaphragm or liver shadow. The pain and localized tenderness gradually increased over the liver area on the right side. *July 3*: White blood count, 14,000. Polys., 71 per cent. Lymph., 25 per cent. Eosin., 4 per cent. An aspiration needle was inserted deep into the liver substance. At the eighth interspace, mid-axillary line, some brick-red pus was obtained. The patient was prepared for operation. Ether anesthesia was used. A section of the ninth rib was resected in the mid-axillary line and the pleura was pushed upward. An incision was made through the diaphragm. Kelly forceps were directed into the liver substance about 4 centimeters along the path of the aspirating needle and a large abscess was found and opened widely. About 500 cubic centimeters of a brick-red pus were evacuated and a rubber tube was inserted into the abscess cavity and fastened to the skin by a silkworm gut suture. *Entamoeba histolytica* cysts were found in the pus. He was given two courses of emetine hydrochloride, 10 days apart. The wound drained for several weeks and patient made an uneventful recovery.

Case No. 2.—Alex P., private, United States Marine Corps. White. Age, 27. Admitted December 16, 1923, complaining of fever, chills, and pain over right lower chest. Family history negative. He had been in the Tropics for about 18 months. He had a mild attack of abdominal pain and diarrhea in January, 1923. About three days before admission he developed mild gastrointestinal symptoms, which were followed by chills and fever and pain in the right lower chest. During the first day of his illness he had been constipated and had taken a cathartic. Due to the fact that he was trying to make the next transport, which was due in a few days, he did not report to the sick bay.

Upon admission he appeared very toxic and apprehensive. His skin was moist and his tongue was coated. The right chest was flat below the level of the fifth rib in the midaxillary line. No breath sounds were heard over this area. Expansion was limited on the right side, and there was no excursion of the diaphragm on this side. The abdomen was tympanitic, and there was some tenderness in the epigastrium. Temperature, 103° F. Pulse, 100. Respiration, 30. *December 17*: Temperature 104° F. Pulse, 104. Respiration, 32. White blood count, 21,000. Polys., 85 per cent. Lymp., 15 per cent. Urine, negative. Blood culture, negative. *December 18 to 26*: Temperature varied from 103.2° F. to 99.4° F., remaining above 101° F. most of the time. Respiration, 33 to 50. Patient had a dry cough with blood-tinged sputum. Chest was negative except for the dullness and the diminished expansion on the right side. The stools were negative for amebae. Repeated aspirations just above the diaphragm were negative. His condition gradually grew worse,

and the pain in his right chest and epigastrium continued with some nausea and profuse sweating. *December 27:* Fluoroscopy showed that the liver shadow has increased both upward and downward and there was no excursion of the diaphragm on the right side. There were no irregularities noted in the outline of the diaphragm or the liver shadow. The lungs were negative. An aspirating needle was inserted into the dome of the right lobe of the liver and muco-purulent pus was found. The patient was prepared for operation, which was done under local anesthesia. The right twelfth rib was resected and the liver was approached by the retroperitoneal route. A large abscess cavity was found in and around the dome of the right lobe of the liver. About 1,000 cubic centimeters of a flocculent, muco-purulent material was evacuated, in which *Entamoeba histolytica* cysts were found. Two rubber tubes were inserted into the large abscess cavity. *December 28:* The wound was draining a large quantity of muco-purulent, chocolate-colored material and the general condition of the patient was improved. Later in the day the patient had a profuse hemorrhage from the bowel. He developed signs and symptoms of severe hemorrhage and expired.

Post-mortem examination revealed a large abscess in the right lobe of the liver, which had ruptured subdiaphragmatically. About two-thirds of the substance of this lobe had been destroyed by the abscess. No ulcers were found in the gastrointestinal tract, but blood was apparently oozing everywhere from the mucous membrane of the intestines.

Case No. 3.—J. P. A., Lieutenant, United States Marine Corps. Aviator. Age, 30. White. Admitted January 1, 1923, complaining of pain in epigastrium and gastric distress. Family history negative. He had been in the Tropics in 1916 and 1918 and has been doing duty in the Tropics during the last 11 months. He has had no previous illnesses and was in perfect health until four days prior to admission, when he developed a mild attack of dysentery. He was given antidyenteric serum. The dysentery gradually improved. The day before admission he developed a pain in the epigastrium and some pain in the gall-bladder region. He also had a little gastric distress and a little fever.

Physical examination upon admission was negative, except for slight tenderness in epigastrium and moderate abdominal tympanites. His tongue was coated. He was nauseated and vomited. Temperature, 100° F. Pulse, 90. Respiration, 24. Urine was negative. Stools were negative for entamoebae and *B. dysenteriae*. Blood culture was negative. White blood count, 9,800. Polys., 62 per cent. Lymph., 38 per cent.

January 1 to 8: Temperature, 98° F. to 103° F. Pulse, 90 to 120. Respiration, 20 to 30. Abdominal distention increased with obstinate constipation and his condition gradually grew worse. *January 5:* He has a marked serum reaction and his gastric distress and vomiting have gradually increased. *January 8:* Fluoroscopy shows limited excursion of the diaphragm, especially on the left side, and a dense shadow in the epigastrium (apparently a mass of omentum). There were no irregularities noted in the outline of the diaphragm or liver shadow. The diagnosis of liver abscess was made and patient was prepared for operation.

An incision was made in the mid line from the xiphoid process extending downward about 8 centimeters. The parietal peritoneum was found adherent to the pyloric end of the stomach and to the anterior surface of the liver. The adhesions between the parietal peritoneum and the stomach were separated and also the adhesions between the parietal peritoneum and the anterior surface of the left lobe of the liver, upward for about 8 centimeters. At this point a soft spot was found on the surface of the liver. The abdominal cavity

was walled off completely by a mass of adherent omentum. With the index finger the abscess found on the upper surface of the left lobe of the liver was opened and about 100 cubic centimeters of a creamy, flocculent pus was evacuated. A rubber tube was inserted into the abscess cavity and was fastened to the skin by a silkworm suture. The upper end of the wound was left open to facilitate drainage. The next day the wound was draining brick-red pus in which *Entamoeba histolytica* in the precystic and cystic stages were found. The wound kept draining for 10 days, during which time the patient had a slight elevation of temperature.

He was given two courses of emetine hydrochloride, 10 days apart. The wound gradually closed and, except for some abdominal distention which continued after the operation, the patient made a rapid and uneventful recovery.

Case No. 4.—J. B. T. Age, 53. Rancher and native of Guam. He was admitted to the hospital March 21, 1924, complaining of a slight pain in epigastrium and fever. His previous history was negative. He had always lived in Guam and stated that he had never had dysentery. One week after admission he noticed a slight pain in the epigastrium which gradually grew worse. He was constipated and had taken castor oil with poor results. The day before he entered he felt feverish and nauseated but did not vomit.

Day of entrance: Temperature, 102.5° F. Pulse, 90. Respiration, 25. Well nourished; well developed. Skin, moist; tongue, coated; chest, negative; sclera, slightly jaundiced; slight tenderness and rigidity in epigastrium. Urine—albumin, negative; sugar, negative; a few granular casts present. White blood count, 16,200. Polys., 72 per cent. Lymp., 22 per cent. Eosinophiles, 6 per cent.

March 24, 1924: Temperature, 102.5° F. to 98° F. Pulse, 70 to 90. Respiration, 18 to 25. Pain and tenderness in epigastrium have slightly increased. Rigidity in epigastrium increased. Stools, positive for *Entamoeba histolytica* and *Lambliia intestinalis*, and a few whipworms. X-ray examination of chest, negative. Fluoroscopy showed movement of diaphragm slightly limited, mostly on the left side. There were no irregularities in the outline of the diaphragm. A shadow was seen in upper abdomen (thought to be a mass of omentum).

Patient was prepared for operation. Ether anesthesia. An incision about 3 inches long was made in the mid line, extending downward from the tip of the xiphoid process. The parietal peritoneum was adherent to the visceral peritoneum of the liver at the tip of the xiphoid process. A mass of omentum was found walling off the infection. An abscess the size of a walnut was found at this point in the anterior surface of the left lobe of the liver. About 1 ounce of a muco-flocculent pus was evacuated, which was found to contain numerous *Entamoeba histolytica*. A rubber drainage tube was inserted and anchored to the skin. Patient made a good recovery. The wound drained a very small amount of pus for one week, during which time the temperature varied from 99 to 97°.

Patient was given a course of emetine hydrochloride. He made a very rapid recovery.

Case No. 5.—C. B. T., private, United States Marine Corps. Age, 24. He arrived in Guam November 30, 1923, and had had no previous tropical duty and no attack of dysentery.

March 28, 1924, he was admitted to the sick list, complaining of pain in his right lower chest and fever. This pain had gradually increased during the last four days and upon admission was rather severe. He had some dyspnea and an expiratory grunt. Temperature, 103° F. Pulse, 110. Respiration, 35.

White blood count, 20,000. Polys., 68 per cent. Lymph., 26 per cent. Eosinophiles, 6 per cent. Urine, negative.

Physical examination: Well developed and well nourished. Skin, moist. Patient appeared uncomfortable. Tongue was coated. There was diminished expansion of right side of chest and dullness extended up to the sixth interspace in the mid-axillary line. There was slight tubular breathing heard over right upper lobe, but no definite signs of any consolidation of lung tissue. Heart, negative. Abdomen, negative.

April 1: Symptoms gradually increased in severity. Temperature remained between 100 and 103° F. Respiration, 30 to 35. Pulse, 90 to 100. Patient complains of an indefinite pain over right lobe of liver and there is slight tenderness in upper right abdomen. Stools, negative for entamoeba.

April 4: Temperature, 99 to 103° F. Pulse, 80 to 100. Respiration, 30. Tenderness in right upper abdomen has increased, and the pain over right lobe of liver is more acute. Lungs and pleura, negative except for diminished expansion on right side. White blood count, 14,800. Polys., 81 per cent. Lymph., 15 per cent. Eosinophiles, 4 per cent. X-ray examination of chest, negative. Diaphragm was stationary on right side and apparently higher than normal. An aspirating needle was inserted into the right lobe of the liver and muco-flocculent pus was obtained. Patient was prepared for operation. The right twelfth rib was resected and the liver was approached through the retroperitoneal route. An abscess was found within the right lobe of the liver and about 600 cubic centimeters of a muco-flocculent pus were evacuated. Two rubber tubes were inserted, extending into the liver about 6 inches.

Patient made a good recovery. Drained large quantities of muco-pus, which was positive for *Entamoeba histolytica*. The temperature continued between 99° F. and 101° F. during the first week, and from then on it remained normal. He was given 1 grain of emetine hydrochloride, hypodermically, daily for 10 doses. His stools continued negative for ameba. He made a rapid, uneventful recovery.

DIAGNOSIS

The characteristic feature of a liver abscess is the varied clinical picture produced, both by acute and chronic symptoms. The onset may be sudden and the symptoms fulminating, similar to a lobar pneumonia, or this disease may have an insidious onset like a tuberculous peritonitis.

The skin is moist and occasionally a tint of jaundice is noticed. The tongue becomes coated, and the patient has vague gastrointestinal symptoms, with a dull pain in the upper abdomen which can not be localized. There may be a slight spasticity of the upper abdominal muscles or only slight tympanites with a doughy resistance. There is a slight increase of the eosinophiles and also a slight increase of lymphocytes.

The diagnosis depends chiefly upon the X-ray findings and the ability to locate flocculent or brick-red pus in the liver with the aspirating needle. The splinting of the diaphragm on the same side of the abscess is a very characteristic symptom, with absence of definite pulmonary findings. No irregularities of the outline of the diaphragm were noted, but the excursion of the diaphragm on

the affected side becomes limited or absent. The liver shadow may be increased, due to the great quantity of pus, which is sometimes present, and also due to the mass of omentum which forms immediately below the liver at the site of the abscess in its attempt to wall off the infection.

TECHNIQUE OF RETROPERITONEAL METHOD OF DRAINING A LIVER ABSCESS

1. An incision is made along the right twelfth rib extending to the edge of the sacrospinalis muscle. The entire twelfth rib is resected subperiosteally.

2. A transverse incision is made in the bed of the twelfth rib at the level of the first lumbar spinous process, which will avoid the pleura. This dissection is continued to the renal fascia.

3. The renal fascia is separated from the diaphragm by blunt dissection. The parietal peritoneum, which is continuous with the renal fascia, is further separated from the diaphragm. At this point, if the abscess has not been located, an aspirating needle can, without difficulty, reach any part of the right lobe of the liver and the spaces above and below the liver. If an abscess is present in the right lobe of the liver near the surface, the parietal peritoneum will be adherent to the liver and thus close off the abdominal cavity. If the parietal peritoneum is not adherent to the visceral peritoneum of the liver, it can be easily attached by a fine catgut suture.

4. If an abscess has been found deep within the liver substance, the aspirating needle is left in place and an opening is made into the liver by blunt dissection, following the line of the needle. (Fig. 1.)

5. An opening is made into the liver large enough to facilitate free drainage. One or two rubber tubes are inserted to the bottom of the abscess cavity and are anchored to the skin by a silkworm-gut suture.

Emetine hydrochloride should be given, beginning on the second or third day after the operation. One-third grain emetine hydrochloride is given hypodermically in three doses on the first day and then 1 grain is given hypodermically each day until 10 grains have been given. This course is repeated in 10 or 15 days.

CONCLUSIONS

The advantages of the retroperitoneal method are very evident. The operation can readily be performed under local anesthesia. The twelfth rib which is resected is functionless and the wound passes through soft tissues, which reduces shock, facilitates drainage, shortens convalescence, and leaves no permanent disability or impairment.

If there is any question about the diagnosis, the aspirating needle can be used to a great advantage in exploring the liver and the spaces

above and below the liver and the perinephritic area. One can also look through the transparent peritoneum and see the condition of the upper abdominal cavity.

If a retroperitoneal or retrocaecal abscess is found it can readily be drained by extending the incision downward and forward toward the anterior superior pubic spine. If an empyema is found above the diaphragm it can be drained by opening the pleura above the diaphragm and inserting a drainage tube.

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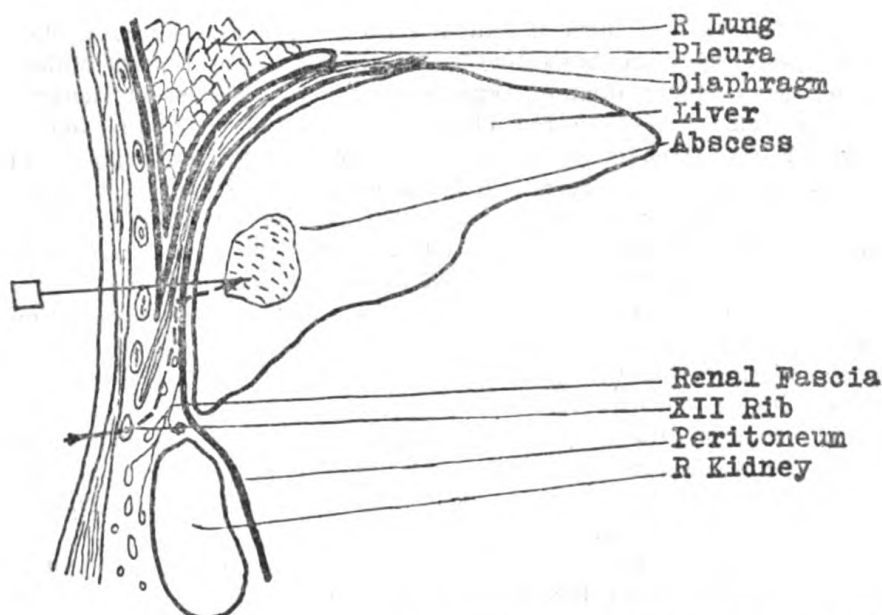


FIG 1.—Schematic section showing an aspirating needle in the abscess cavity. Broken arrow indicates route followed in the retroperitoneal operation

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PAROXYSMAL HEMOGLOBINURIA—CASE REPORT¹

By W. H. CONNOR, Lieutenant Commander, Medical Corps, United States Navy

REPORT OF CASE

A male, aged 35, was admitted to this hospital on January 16, 1925, with the following complaint: For the past three years he has periodically passed chocolate-colored urine. In the beginning this abnormal urine would appear about once monthly, but at present these attacks are occurring more fre-

¹ Read before the staff, U. S. Naval Hospital, San Diego, Calif.

quently. They are usually preceded by malaise, nausea, pain in kidneys, and weakness, and usually last from 12 to 36 hours. After the attacks have subsided he has returned to work. He has no idea as to what produces these attacks, but they seem to have a definite connection with overexertion. The use of many widely-advertised kidney remedies has been of no avail in checking this condition; in fact, the attacks have become more frequent.

The family history is of no importance, and the past history adds but little. He admits having had gonorrhoea, but states positively that he never had a genital or extragenital ulcer. He does not recall having had malaria, and has never been in the Tropics. During the past five months he has lost about 20 pounds.

The physical examination shows a fairly well developed and nourished individual with a bronzed skin. Mucous membranes appear anemic. There is no glandular enlargement, and the reflexes are normal. There is no demonstrable pathology, except some tenderness over the kidney regions and a blood pressure of 100-65. On urinating in a glass a chocolate-colored urine was obtained, upon which the laboratory made the following report: Mahogany red; acid; sp. gr., 1027; albumin, very large trace; sugar, absent; many hyaline and granular casts; no red blood cells and an occasional leucocyte. Occult blood test, strongly positive. The following day the urinary report was: Color, straw; acid; sp. gr., 1025; albumin, trace; sugar, absent; no casts; no blood; a few leucocytes; occult blood test, negative. The blood examination, 48 hours after admission, showed 4,600,000 reds with a normal color index. The kidney function (Psp) showed 65 per cent in two hours.

On January 19 the blood Wassermann was negative, but an injection of arsphenamine produced, provocatively, a 3 plus reaction. An autohemolysin test was performed and was partially successful. Antiluetic treatment was instituted. On January 27 the urine was normal, but on January 29 the patient had another attack of hemoglobinuria and the urinary findings were as follows: Dark mahogany; acid; sp. gr., 1027; albumin, large trace; sugar, absent; few granular casts; no red blood cells; few leucocytes. The occult blood test was strongly positive.

During the 10 weeks that the patient remained in this hospital he had three attacks, one of which was coincident with an attack of influenza. During this period the patient had many blood Wassermans, with reactions varying from negative to four plus. The patient left this hospital in March greatly improved, and a note from him on June 13 stated that he had returned to work and had not had an attack in a long time. This despite the fact that it is doubtful if he is continuing antiluetic treatment.

DISCUSSION

Paroxysmal hemoglobinuria is a rather rare disease, for during the past 30 years at the Massachusetts General Hospital among 150,000 ward cases only 9 were found. The two etiological factors are malaria and syphilis, the former occurring usually in individuals who have been in the Tropics; the latter, wherever syphilis occurs. Keen observers, even before the advent of the complement fixation test, had connected hemoglobinuria and syphilis. As more precise methods of the diagnosis of syphilis developed it became more apparent that paroxysmal hemoglobinuria was a late manifestation of congenital or acquired syphilis.

In order to produce this sudden marked change in the color of the urine there must be a great destruction of the red-blood cells. This destruction of the individual's red-blood cells must be due to the presence of a hemolysin, which under certain conditions becomes suddenly activated. This period of activity is usually short, and the hemolysin then becomes inactive. It has been demonstrated that chilling of the blood is sufficient to induce an attack in an affected individual. The plunging of the hands and wrists into cold water is often sufficient.

The presence of this hemolysin may be demonstrated *in vitro* by coagulating the patient's blood at 37° C. and then chilling the serum to 15° C. If this chilled serum and red-blood cells are mixed and incubated at 37° C. hemolysis will take place. What other factor may cause this hemolysis is problematical. In this particular case overexertion was stated as the cause. As perspiration accompanies exertion it may have been the evaporating of the perspiration, with resulting chilling, that was really the cause.

The mechanism of hemolysis in the hemoglobinuria which appears in hemolytic jaundice is probably quite different from that of Paroxysmal Hemoglobinuria. Widal has called attention to the fact that experimental hemolysis caused by chemical poisons results in icterus, if the dose is small, and in hemoglobinuria if the dose is large. From a study of all obtainable data Giffin concludes that the hemoglobinuria of hemolytic jaundice is not due to syphilis—that it is not brought on by exposure to cold and that the mechanism is not analogous. From experiments Hannema and Rytma proved that carbonic acid gas plays a very important part in the production of hemoglobinuria and that a mere chilling of the blood is sufficient to make evident this gas production.

These attacks may be ushered in with a chill accompanied by nausea, malaise, and pains in loins and legs, and cyanosis of the head, feet, and ears, may appear. The intensity and duration of the hemoglobinuria seems to have a definite relation to the amount of the chilling.

Physical examination may or may not reveal a syphilitic background. The anæmia will depend upon the frequency and severity of the attacks. A positive Wassermann reaction may be expected. As death does not result, there is no characteristic morbid anatomy. The differential diagnosis rests between hematuria and hematoporphyrinuria. In hematuria the urine will show red blood cells. In differentiating hematoporphyrinuria and hemoglobinuria the finding of characteristic absorption bands in the spectroscopy of the different forms of hemoglobin will suffice.

For all practical purposes the finding of a dark urine giving a strong guaiac test with few or no red blood cells in the sediment will

be sufficient for a diagnosis of hemoglobinuria. The presence of a positive blood Wassermann reaction or the demonstrating of a hemolysin in the patient's blood that is activated by chilling will be synonymous with syphilis, while malaria will be diagnosed by the presence of the plasmodia.

Hemoglobinuria may be due to poisoning by chlorate of potash, naphthol, carbon bisulphide, transfusion with improperly matched blood, etc., but these can be easily eliminated as the etiological factor. The prognosis is good but the condition may last for many years. Under treatment the underlying pathological entity may be corrected, but the hemolysin seems to remain in the blood.

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OSTEITIS DEFORMANS—REPORT OF TWO CASES¹

By H. E. LIST, Lieutenant (Junior Grade), Medical Corps, United States Navy

Osteitis Deformans, first authentically described by Paget in 1877, is by no means so rare as it was formerly considered. The supposed great rarity of the disease was due to the paucity of reported cases, the failure to recognize the clinical picture, and the absence of the present-day Roentgenological technique.

The disease as it presents itself clinically is most common in the fifth or sixth decade, but earlier cases have been reported, in at least one of which the disease began as early as the twenty-seventh year. It is insidious in its onset, and its etiology is practically unknown, although several theoretical factors have been advanced, among them syphilis and arteriosclerosis. Some consider it an endocrinopathy. But whatever the cause, no form of therapy yet proposed has materially altered the course of the disease. Men are more often affected than women, and there often seems to be present a familial predisposition. The disease is slowly progressive as a rule, but probably only indirectly shortens life. The typical appearance of the peculiarly shaped skull, the relatively small face, the broadened pelvis, the bowing of the legs, etc., are unmistakable, and Roentgenological examination of the cranial vault and long bones renders the diagnosis without doubt.

A report of two cases is submitted.

¹ From U. S. Naval Hospital, New York.

CASE 1

White male, age 74, weight 180 pounds, admitted March 12, 1925.

Complaint.—Pain in left knee.

Family history.—Father died at 42, cause unknown. Mother died at 32; cause, tuberculosis. History for malignancy, syphilis, and cardiac or metabolic disturbances, negative.

Past history.—Usual childhood diseases. Pulmonary hemorrhages, 1879. Rheumatism, 1887. Fracture left wrist, 1903. History for venereal infection, negative.

Present illness.—Has had pain in left knee for past two years, especially on climbing stairs. Two months before admission stepped down an incline and twisted knee severely. Knee has been painful ever since and patient had been unable to bear any weight for five weeks following injury.

Physical examination.—(Positive findings.) Well developed, well nourished, and well preserved. Walks with a limp. Teeth: Much dental repair. Extremities: Movement of excursion of left knee if rapidly performed causes moderate degree of pain. Motion of flexion and extension not limited. There is a sense of fullness over the head of the left tibia, as though the head of the bone were hypertrophied. The left patella is not so freely movable as the right. Arms: Brachial arteries are firm and tortuous.

Laboratory.—Wassermann, negative. Urine: Amber; clear; reaction, acid; sp. gr., 1.020; albumen, negative; sugar, negative. Blood chemistry: Non-protein nitrogen, 32; urea nitrogen, 15; uric acid, 1.5; creatinine, 1.6; sugar, 94.

X ray.—The left femur shows marked hypertrophic changes, with increased trabeculation and areas of increased and decreased density. This condition is also present in the left patella, right humerus, and to a small extent in the crests of the iliac bones. The bones of the skull are of normal thickness, with no areas of increased or decreased density. There is no increase in convolutional or vascular markings. Frontal, sphenoidal, and maxillary sinuses are negative. Conclusion: Osteitis Deformans. (Note: This is evidently an atypical form of osteitis deformans as well as early, because of the fact that the pelvic bones and the bones of the skull are not markedly involved.)

CASE 2

White male, age 51, weight 167 pounds.

Complaint.—Pain in right shoulder, right chest, and right knee.

Family history.—Mother died following childbirth. Father died as the result of a fall. Married. No children living or dead. Wife had no miscarriages.

Past history.—Measles and diphtheria in childhood. Dysentery, 1898. Varicocele, 1899. In 1909, while approaching a swinging door intending to pass through, door was approached from the other side and swung open, striking patient on left shoulder and fracturing left clavicle. He was sent to a hospital and a few months after, while still a patient there, sustained another fracture. While sitting at a table eating, another patient passed him a dish of beans which he grasped. Immediately the left humerus snapped, and a fracture was found in the middle third. A few months after this, patient was hit by a horse and buggy and knocked down, sustaining another fracture of the left humerus one inch below the site of the first fracture. Three years later patient was in a telephone booth talking over the phone. He had just finished his conversation and turned around preparatory to leaving. The quickness of the turn fractured the right tibia and fibula in

their lower one-third. Three years ago patient wore a $6\frac{7}{8}$ hat and now a $7\frac{1}{8}$ hat is tight for him. Two years ago patient wore trousers with a 36 waist, and now he wears a 42 waist.

Present illness.—Two days before admission patient was thrown from a street car and dragged several feet. He was sent to the hospital to determine whether any ribs had been fractured.

Physical examination.—(Positive findings.) Posture: Stooped with knees slightly flexed. Gait: Waddling with tendency to cross-gait. Cranial vault enlarged and out of proportion to face. Clavicles prominent. Pelvis wide. Both legs bowed outwardly and anteriorly. Old callous formation on left humerus and left and right tibiae. Right tibial spine prominent. Arteries sclerotic and tortuous.

Laboratory.—Urine: Amber; clear; reaction acid; sp. gr. 1033; albumen, 2 plus; sugar, negative; white blood cells, many; mucus, present. Wassermann, negative.

X-ray examination.—Skull: There is a marked thickening of the bones of the vault with areas of increased and decreased density throughout. Chest: There is no evidence of fracture of the ribs. Ribs show numerous areas of increased and decreased density, giving them a fuzzy appearance. There is some dilatation of the ascending aorta in the region of the beginning of the arch with some calcification. There are numerous calcified areas in the hila. Right clavicle, acromial process of right scapula, left humerus, and left ulna show marked bony thickening with increased trabeculation and areas of increased and decreased density. Pelvis, etc.: Pelvic bones, femora, right patella, tibiae, and fibulae show marked bony thickening and roughening with increased trabeculation and areas of increased and decreased density. Arteriosclerosis is shown in Roentgenograms of the arch of the aorta, radial, and ulnar arteries, iliac arteries, and tibial arteries. Conclusion: Osteitis Deformans with marked arteriosclerosis.

No attempt was made to direct any form of therapy which would tend to arrest the progress of the disease. Physiotherapy was used for the alleviation of the pain of which the patients complained, and was more or less successful.

NOTES AND COMMENTS

ESPECIALLY MERITORIOUS ARTICLES—1924

The board of medical officers appointed by the Surgeon General to consider the merits of articles which appeared in the *BULLETIN* during the year 1924 and to designate those articles of special merit worthy of letters of commendation from the Surgeon General has made its report. The articles selected, with the names of their authors and dates of publication, are given below. Letters of commendation have been sent to the authors, and the Surgeon General has recommended in every case that the letters be made a part of the official records of those receiving them. The articles selected are:

THE DETECTION OF THE PSYCHOPATH AND THE CLASSIFICATION OF NAVAL RECRUITS IN ACCORDANCE WITH THEIR INTELLIGENCE, by A. W. Stearns, Lieutenant, Medical Corps, United States Naval Reserve Corps, February, 1924.

AVIATION ACCIDENTS AND THEIR PREVENTION, by J. F. Neuberger, Lieutenant, Medical Corps, United States Navy, March, 1924.

AN ACCOUNT OF THE MEDICAL DEPARTMENT OF THE MARINE CORPS EAST COAST EXPEDITIONARY FORCE DURING THE FALL MANEUVERS OF 1923, by W. Chambers, Lieutenant Commander, Medical Corps, United States Navy, May, 1924.

MY FIRST DUTY ABOARD SHIP, THE U. S. S. *Relief*, by Thomasina Libby, Nurse, United States Navy, June, 1924.

STUDIES OF SUBMARINE VENTILATION IN TROPICAL WATERS, by R. F. Jones, Lieutenant Commander, Medical Corps, United States Navy, June, 1924.

FOOD IN ITS EPIDEMIOLOGICAL ASPECTS—FOOD POISONING, by J. R. Phelps, Lieutenant Commander, Medical Corps, United States Navy, July, 1924.

THE ANNUAL PHYSICAL EXAMINATION, by W. M. Kerr, Lieutenant Commander, Medical Corps, United States Navy, September, 1924.

TANNIC ACID IN THE TREATMENT OF BURNS

The treatment of burns has engaged the attention of the medical profession from time immemorial. It is a subject of vast importance to the naval medical officer in time of peace and will become of even greater importance in time of war.

Although picric acid has been of great value in the treatment of burns, most surgeons have been dissatisfied with it because of its toxicity and are constantly looking for something better to replace it.

In *SURGERY, GYNECOLOGY, and OBSTETRICS* (Vol. XLI, No. 2 (August) 1925), under the title above, Edward C. Davidson, M. D., of Detroit, has described his experiences with tannic acid in the treatment of burns and reported his results in 25 cases treated at the Henry Ford Hospital.

Davidson discusses the various theories as to the causation of the symptoms following burns of different degrees as follows:

"The theories which have been evolved to explain these phenomena may be arranged roughly into the following groups: (1) Those in which interference with the normal functions of the skin is considered to be the essential factor in the causation of phenomena; (2) those in which the effects observed are attributed to changes in the blood resulting in altered function; and (3) those in which the picture is explained on the basis of absorption of a toxic substance in the blood stream."

The first theory he dismisses because it is not supported by any data presented.

The second theory, that the symptoms are due to blood changes, has some evidence in its favor, but is not considered by the author as sufficient to explain all the phenomena.

As to the toxemia, he says: "There is certain convincing evidence that suggests the formation at the site of the burn of a toxic substance, the absorption of which is responsible for the constitutional reaction * * *."

The finding of hyperemia of the abdominal and thoracic organs in cases of early death and of inflammatory changes in cases where death occurred later are cited. Toxic substances are found in the urine of burned patients. The author tells of the work of Vogt and of Vaccarezza who "observed that when parabiosis was established between two animals and one was burned the other showed evidence of toxæmia. The symptoms in the burned animal were observed to be less severe under such circumstances than when it was alone. It was further demonstrated that toxic symptoms did not develop in the unburned animal within the first 12 hours, but both animals finally died of toxæmia when left united."

Further, Doctor Davidson says:

"The clinical course which follows extensive superficial burns can not be attributed to interference with any of the functions of the skin; nor can it be ascribed to the known changes of the blood. While these are doubtless contributing factors, they in themselves do not adequately explain the phenomena observed."

"Of the various theories presented, therefore, that which attributes the constitutional reaction to absorption of some toxic substance or substances from the burned area is most strongly supported by the available evidence.

"The clinical and experimental facts suggest that the rational manner of combating the toxæmia would then lie in some form of local treatment, which would prevent the absorption of autolytic products of protein decomposition. This might be accomplished (1) by arresting the autolytic process; (2) by removing the products of decomposition mechanically or by baths; (3) by slowing the process of absorption by the use of vasoconstrictor drugs; and (4) by causing a local coagulation of all devitalized tissue.

"There are data available which show that the rate of autolysis *in vitro* may be controlled by changing the hydrogen-ion concentration of tissue. Wiener found that the intracellular proteases act only in a faintly acid medium and that their activity is entirely checked by a slight shift to the alkaline side of the neutral point. There has been clinical application of this principle in the widespread use of sodium bicarbonate compresses and baths in the treatment of burns. This phase of the problem warrants further study.

"There is a great deal of evidence in favor of removing as much of the devitalized tissue as possible in an effort to combat toxæmia * * *."

"The fourth possible means of limiting absorption of the toxic material by coagulation or precipitation of the injured protein was suggested to the writer by the observation of Pfeiffer that the toxic extract from burned tissue is precipitated *in vitro* by bichloride of mercury in acid solution or by phosphotungstic acid. Bichloride of mercury has often been applied to burns to combat secondary infection. Fauntleroy, using a 1:5,000 solution, arranged a method of continuous irrigation, while Ravogli used a 1:2,000 solution on compresses. In view of the fact that there is a large absorbing surface, this treatment is not without danger.

"While investigating the possibility of using phosphotungstic acid as a coagulant, the writer was advised by E. C. Mason of the similarity of tannic acid and phosphotungstic acid in regard to the property of precipitating protein. Tannic acid is a nonnitrogenous amorphous powder which is readily soluble in water, glycerin, and alcohol, but insoluble in ether and chloroform. It precipitates proteins, alkaloids, some glucosides, and the salts of the heavy metals. It forms a more or less stable compound with the protein constituents of the body fluids and cells. When applied to a burned surface in dilute solution, further penetration into the deeper lying protoplasm is apparently prevented by this action, and the true astrin-

gent effect appears to be limited exclusively to the most superficial layers of tissue. Schuetz has shown, however, that when first applied in concentrated solutions, the tannic acid may penetrate before superficial coagulation has occurred, and in such an event a deep caustic action may result. The precipitated proteins in the surface treated provide a protective coating against chemical, bacterial, and mechanical action as well as against sensory and inflammatory irritation. When tannic acid comes in contact with blood in a test tube, it precipitates the protein; when administered intravenously, it acts similarly, portions of the precipitate forming small emboli. From this it may be concluded that the effects of tannic acid are limited to the point of application.

"From the foregoing consideration of the properties of tannic acid, it is evident that it might be efficacious in precipitating the poisonous materials in burned tissue and thereby in preventing their absorption. It was with the idea of determining its value in this respect that the present investigation was undertaken.

"It is noteworthy that picric acid, which has some properties in common with phosphotungstic acid and tannic acid, has been used extensively in the treatment of burns for its desiccant and analgesic action. The chief objections to its use have been the facts that its coagulant action is not marked in the concentrations used and toxic symptoms are not infrequently observed following its employment over extensive areas."

Full reports are given of the 25 cases treated with tannic acid. The results were so good that we are justified in believing that in tannic acid we have an agent which will prove of great worth in treating cases of burns.

The author's method of procedure follows:

"The method finally adopted in the management of cases of burns may be briefly described as follows: As soon as the patient is seen he is given a relatively large dose of morphine sulphate hypodermically (for an average adult $\frac{1}{4}$ grain) to alleviate the intense pain. The burned area is then covered with dry sterile gauze pads, which are held in place by sterile gauze bandages. This dressing is then soaked with a 2.5 per cent aqueous solution of tannic acid. This is thought to be the most desirable concentration, although solutions as dilute as 0.75 per cent and as concentrated as 5 per cent have been used in some cases described. It is essential that the tannic acid solution be made up fresh just before use, because it deteriorates upon standing with the formation of the far less astringent gallic acid.

"In order to prevent the deep caustic tissue injury found by Schuetz to follow the application of concentrated tannic acid, small sections of the dressing have been opened for inspection at the end

of 12 hours, 18 hours, and again at the end of 24 hours. As soon as the part is found to have assumed a light brown color all dressings are removed. In order to facilitate removal of the dressings without pain to the patient and without causing further trauma, it has been found desirable to wet the gauze with fresh tannic acid solution shortly before this is done. The wound is thereafter left exposed to the air, but is carefully protected from mechanical injury, chilling, and bacterial invasion by a suitable cradle draped with sterile linen. In the more serious cases artificial heat has been supplied by placing within the cradle so prepared one or more ordinary electric-light bulbs.

"In a few cases 5 per cent tannic acid ointment (made with equal parts of vaseline and lanolin as a base) was substituted for the aqueous solution. Although it appeared to have a definitely beneficial effect, it is far less efficacious than the former. The chief value of the ointment is in its use about the eyes, where the astringent solution can not be used with entire safety.

"One of the most essential features of the management of all burn cases is that of keeping up the fluid balance in the body. This is accomplished by forcing fluids by mouth, where possible, or by hypodermoclysis, proctoclysis, or intravenous infusions, according to the special indications in each case. Blood transfusion has been employed in some of these cases, apparently with favorable effects."

In his discussion of the case histories Davidson brings out several facts in favor of the employment of this method of treatment. These are: (1) The toxemia was less than that following burns of similar extent and severity treated by other methods; (2) the mortality rate was low; (3) the tannic acid has a marked analgesic effect, thereby lessening the suffering of the patient; (4) the distressing changing of dressings is done away with; (5) scar formation is reduced to a minimum; and (6) the intensity of infection in macerated sloughs is less than that observed in cases treated in other ways.

HYPOSULPHITE OF SODIUM IN TREATMENT OF MERCURY-FAST AND ARSENIC-FAST SYPHILITICS

Under the above title, R. Wernigk, M. D., of Los Angeles, writes interestingly in the *American Journal of Syphilis* (IX:3:(July) 1925) on the treatment of the old, overtreated syphilitics and their many complaints.

In the opinion of the author, the complaints of these patients are very real and not imaginary, as they are often considered. Among the symptoms mentioned are morning headaches, various paresthesias, numbness in fingers and toes, diminished tactile sense, dizzy sen-

sations, poor memory, depression, irritability, poor thought concentration, disturbed sleep, tired feeling, pains in neck and back, poor appetite, bad taste in mouth, deafness, and neuritic and neuralgic pains.

All medical men have seen such cases and have found them baffling. The general tendency is to subject such patients to further mercury and arsenic as soon as a syphilitic history is given. This, according to Wernigk, is exactly what should not be done, as the symptoms are not due to syphilis but to overtreatment by these drugs. He believes that the body cells—especially those of the brain, spinal cord, heart, and liver—become impregnated with the metals and that this impregnation produces the symptoms.

He further says, "We know that these patients are mercury and arsenic fast from the fact that a few intravenous injections of even small doses of mercury at once cause severe reactions and that injections of arsphenamine are poorly tolerated and the patients feel worse instead of better."

The author's theory is that the mercury and arsenic, having been changed to albuminoids in the body, may be taken up by the cells and become an integral part of them. If many of these cells are affected, it is easy to see that the health of the patient will suffer and he will have a real cause for his complaints. In hyposulphite of soda we have an efficacious and harmless remedy which will dissolve out of the damaged cells the foreign and harmful metals.

The author's method of treating these cases consists of the use of iodides, Glauber or Epsom salts, and sweats, with the addition of intravenous injections of hyposulphite of soda. He gives large doses starting with from 3 to 5 grains two or three times a week. He has given hundreds of injections with no bad effects. All the patients have been benefited, some markedly. He also uses the treatment in some patients who have never been treated for syphilis but who have been treated for other complaints and in whose cells there may be incorporated other metals.

In conclusion, Wernigk says: "I also believe that all secondary and especially tertiary syphilitics should at intervals be subjected to a course of hyposulphite of soda injections before resuming the mercury and arsenic treatment."

LUNGS AND WAR GASES

In the Archives of Internal Medicine (Vol. 36, No. 2, Aug. 15, 1925), A. R. Koontz, M. D., Pathologist, Medical Research Division, Edgewood Arsenal, reports the results of some interesting experiments on dogs under the title, "When do lungs return to normal following exposure to war gases?"

Dogs which had recovered from the effects of gassing with phosgene, mustard, lewisite, chlorin, chlorpicrin, and methyl-dichlorarsin were killed by the injection of 10 cubic centimeters of a saturated solution of magnesium sulphate into the left ventricle of the heart. This method was chosen because it was found to produce the minimum amount of congestion of the lungs. In all 313 dogs were studied.

It is not necessary for us to follow closely the details of this work, but the conclusions drawn from the experiments are of such interest that they will be quoted in full:

"1. In the great majority of dogs gassed at lethal concentrations, no pathologic lesions can be demonstrated from two months to a year after recovery.

"2. In a minority of instances permanent lung damage is done; but this damage is not widespread, is generally confined to small areas, and is generally in the form of small patches of organization, thickening of the bronchial walls with loss of elasticity, or occasional closing of the bronchioles by organized exudate.

"3. All such damage will ultimately result in fibrous tissue. This small amount of scar tissue can hardly affect the functional efficiency of the lungs.

"4. Since the lungs of dogs are more delicate than those of human beings, it is reasonable to conclude that in the vast majority of surviving human patients, who were not gassed so severely and who receive infinitely better care in hospital, all lesions have disappeared within a short while after gassing, and that the small amount of fibrosis remaining in the minority of cases can hardly be a cause of serious disability."

DRESSING FOR FRACTURED RIBS

The appearance of an article in the *Military Surgeon* should mean that it will be seen by every naval medical officer, since all such officers should be members of the Association of Military Surgeons of the United States and subscribe to its official publication. Unfortunately, the majority of naval surgeons do not belong to the association and so do not see the *Military Surgeon* regularly. Therefore when items of special interest appear in that journal it has been the custom to abstract them for this section of the *BULLETIN*. It is to be hoped that, before long, naval medical officers will realize that the Association of Military Surgeons is as much their organization as it is the Army's and will see that it will be greatly to their advantage to be members and to read its journal.

In the August, 1925, number of the *Military Surgeon* (vol. 57, No. 2) Capt. J. R. Knowles, M. O. R. C., United States Army.

describes a simple and convenient dressing for fractures of the lower ribs. It consists entirely of a Jock Strap, such as may be obtained almost anywhere. It is applied in an inverted manner, the strap going over the shoulders and the bellyband being pulled down over the lower chest where it fits snugly and gives adequate support to the injured ribs. The wider the bellyband the better, provided it does not wrinkle at any point.

This dressing has great advantages over adhesive plaster for use on tender skin, especially in hot weather. No matter how much the patient perspires, his skin will not become irritated under it. It should prove especially useful to the naval service because of the fact that much of the time of its personnel is spent in the tropics where the use of adhesive plaster is always a source of discomfort to the patient and of annoyance to the surgeon.

HARD WATER VERSUS DISTILLED WATER

"Does the long-continued use of distilled water—a necessity on board ships of the Navy—have any good or bad effect upon those who use it?" This is a question often asked in wardroom conversation. The replies vary greatly, some maintaining that the use of distilled water tends to prolong life, others that it is deleterious, and still others that it has no effect. These latter are probably correct, so far as the effects of distilled water upon naval personnel is concerned, for in these days of rapid travel the intervals between opportunities for drinking natural hard water or some substitute for water are short.

In 1915 Capt. L. L. Von Wedekind, Medical Corps, United States Navy, published a paper in the Medical Record in which he claimed that the use of distilled water tended to prevent high blood pressure and arteriosclerosis through dissolving the excess of salts in the body. This has never been corroborated.

John T. Myers, of the department of hygiene and bacteriology, University of Chicago, has recently conducted some experiments with mice, rats, rabbits, dogs, calves, pigeons, and chicks to determine the relationship between natural hard water and the growth of these animals. His experiments and results are discussed in The Journal of Infectious Diseases (vol. 37, No. 1 (July), 1925). He found that white mice on a diet of grains and a natural hard water showed no marked differences in growth or appearance from these on a similar diet receiving distilled water. With white rats the same was found to be true. Young rabbits on a diet of oats, carrots, and alfalfa and the natural hard water were about 30 per cent heavier at the age of 42 days than similar rabbits on distilled water. A few

dogs on a mixed diet and hard water looked better than dogs on distilled water. Two calves given hard water were 20 per cent heavier at 8 months than a similar pair which had only distilled water. Several groups of chicks on a grain diet with hard water gained from 20 per cent to 40 per cent more during the first few months of life than did similar groups on distilled water. At the end of a year the chicks on distilled water had not caught up. Distilled water to which the same salts as were in the hard water were added gave practically the same results as did natural hard water. On a diet containing the essential foods and including cod-liver oil, chicks receiving distilled water grew at the same rate as those receiving natural hard water. In no instance did animals on distilled water develop better than those on hard water, but the reverse was true under several conditions.

So far, then, as growth of the various animals studied is concerned, hard water has a beneficial effect and distilled water is harmful. It does not necessarily follow, however, that men drinking distilled water and eating the scientifically balanced ration supplied in the Navy will suffer any ill effects from the use of the water.

GRADUATE MEDICAL STUDY IN NEW YORK

The committee on medical education of the New York Academy of Medicine has recently prepared and issued a series of synopses of approved opportunities for graduate medical study in New York City. Approved courses are offered in all branches of medical science and art. Many of these have undoubtedly been attended at various times by officers of the Medical Corps of the Navy. Many more medical officers could take advantage of them with great benefit to themselves. Not all of the courses are lengthy, and medical officers attached to ships undergoing repairs at the New York Navy Yard would do well to inquire concerning them.

The latest synopsis received gives the opportunities available for the study of methods for conducting periodic health examinations, a study which is just beginning to be valued at its true worth.

The academy maintains a bureau of clinical information, where detailed information may be obtained regarding opportunities for graduate study, not only in New York but in other cities of the United States and abroad.

Doctors visiting New York for a short time may, upon request, obtain a daily bulletin of surgical clinics free, by mail. A book of the fixed clinics of Greater New York is also issued free of charge.

The New York Academy of Medicine is located at 17 West Forty-third Street, and naval medical officers visiting New York would

profit greatly by a more extensive use of its liberal and gratuitous service.

LABORATORY WORK AS A SPECIALTY

The bureau wishes to remind medical officers of the many attractive features of laboratory work as a specialty, and particularly to direct their attention to its value in furnishing an unexcelled groundwork for the subsequent practice of internal medicine. As a result of progression into broader fields, laboratory men are always needed, and applications for instruction from officers desiring to devote some years to the work are assured of receiving favorable consideration.

COURSE IN AVIATION MEDICINE

The next course of instruction in Aviation Medicine at the Army School of Aviation Medicine, Mitchell Field, Long Island, N. Y., will begin some time in January, 1926.

The bureau will assign several medical officers to this course, and application from those desiring qualification as flight surgeon should be received by December 1, 1925, or as soon thereafter as possible.

As bearing on the advisability of younger officers seeking training in aviation medicine, it is to be noted that, as a rule, service as flight surgeon is limited in duration and furnishes excellent preparation for subsequent specialization in Ophthalmology, Otolaryngology, and Neuropsychiatry.

AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons each year heretofore has generously invited the Surgeon General to nominate a specified number of medical officers as candidates for fellowship in the college.

Although, for officers of the Navy, fellowship is thus made a matter of courtesy, it nevertheless seems proper that there should be presented as candidates only those officers who are fully qualified for fellowship in accordance with the standards set by the college. Consequently it is the policy of the bureau to stand sponsor for only those officers who are prepared to submit the required case reports and who have sufficient interest to do so.

Assuming that the privilege will be extended to the Navy again this coming year, it is suggested that officers desiring to have their names considered for nomination submit their case histories not later than July 1, 1926.

NURSE CORPS

LETTER OF COMMENDATION

The following letter of commendation will be of interest to the members of the Navy Nurse Corps:

SEPTEMBER 10, 1925.

To: Thomasina Libbey, nurse, U. S. N.

U. S. Naval Hospital, Portsmouth, N. H.

Via: Commanding officer.

Subject: Letter of commendation.

1. The board of medical officers appointed to consider the merit of articles which appeared in the UNITED STATES NAVAL MEDICAL BULLETIN during the year 1924 has adjudged your paper, entitled "My First Duty Aboard Ship, the U. S. S. *Relief*," which appeared in the June, 1924, number, deserving of commendation, and I take pleasure in informing you of this fact.

2. In accordance with the statement made in paragraph 4 of the Preface of the BULLETIN, I have directed that a copy of this letter be made a part of your official record.

E. R. STITT.

THE MACKINAC DISASTER

During the recent disaster to the steamer *Mackinac* in the harbor at Newport, R. I., the naval hospital at that station was able to be of great service to the unfortunate victims. The Navy personnel met the situation in the usual helpful manner and showed that not only during war times, but in peace times, they are ready and waiting to give of themselves for the benefit of their fellow men.

The nurses at Newport are loath to tell of the help they rendered and feel that it was a privilege to be so situated that they could be of service when such service was most urgently needed. The chief nurse wrote briefly of their experience during the first two weeks after the accident, and from her letter excerpts are taken which will be of interest to all nurses. A letter is given also from an associate director of the Providence District Nursing Association, who gave valuable assistance under the auspices of the American Red Cross.

The chief nurse writes:

"I must try to tell you something about our experience of the past two weeks. It is a hard thing to do, for after the first horror one's mind seemed to be a blank, except for the mad rush to allay the awful agony of these poor creatures.

"We were at dinner. I had a friend dining with me whom I had not seen for years, when the phone rang and the captain said, 'There has been a terrible explosion! Have all the nurses on duty at once!' The ones who were on duty left the table and went over; the others had to get into uniform. In all it was only 15 minutes before we were all there ready for work. Even when the captain was telephoning the boats were at the dock, and as I reached the top of the stairs in came a row of stretchers loaded with the most awful-looking and screaming objects one could imagine. I ran up stairs to the wards, and all night it was one mad rush, pouring oil and giving hypodermics. Men, women, and children were brought in and put into the first beds available. The place was filled in an incredibly short time with doctors, nurses, and corpsmen. We dressed as many as could go home and sent them out. Remaining with us were the other poor creatures with faces and hands and bodies scalded until they looked as though they had on white masks. Even their eyes were gone. One poor little girl whom they thought dying was screaming so they put her in a room. I stayed with her until some little volunteer came along, then I went out to help. As I was leaving the poor child said, 'Don't leave me; you are just like my mother.' And she couldn't see a thing. In one bed were two little tots about 6 and 4 years old. In the bed next was a baby 13 months old, while across the ward was the mother and in another ward the father. All died.

"It was miraculous how quickly quantities of supplies were brought to us, and I feel that at no other institution could they have had the care that we were able to give. The corpsmen worked till they were ready to drop; the nurses and doctors the same. My friend remained in our quarters and kept house and incidentally comforted many poor women who could not find their folks and were hysterical. Then later she came to the hospital and served coffee to the nurses until late at night.

"I had no idea there were so many nurses in Newport, but they flocked in from all sources. Some here with patients gave us their off-duty time; some on vacations came up to help. The Newport Hospital sent a unit of volunteers for a few days. The Order of the White Sisters did wonderful work; also some from the Cenacle Convent. It was maddening the first week, keeping the ground covered with volunteers, and several stand out in my mind, for they stuck through it all. Not only nurses came to help, but many other women came every day to make supplies. They told me that if I would tell them of things needed they would be so happy to send them, and they have been wonderful about sending delicacies. Mrs. S. has put up for us the loveliest screens on the porch where we have the four remaining men.

"Just now I have four Red Cross nurses, who are on salary, and they are doing 12-hour duty. I have also two volunteers who come in the morning and in the afternoon for the busiest hours. These remaining are so ill and so burned—bad enough on the outside and no one knows how badly on the inside. In fact, most of the deaths were caused from breathing the steam. These are so toxic and irrational at times and have to be handled with such care. The one girl we still have is very sick and one hardly knows yet if she will make the grade. If she lives it seems possible she might be a cripple for the rest of her life, for her feet are so badly burned.

"For four days I had with me Miss Fitzpatrick, from Providence, and she assured me she was going to write you, so I will let her speak for herself. So many of the nurses came and told me they had never been treated so courteously, and that it had been a real pleasure to be here apart from the aid to the sick. Miss M., the Red Cross representative here, has been splendid. She has helped me so much with the nursing proposition since the first enthusiasm has worn off and her hands were more than full, for she went day and night for the first week. Two representatives from the National Red Cross headquarters were here and gave her wonderful assistance in the handling of the families.

"I have saved speaking of my own until last, and I want to tell you they worked uncomplainingly for all kinds of hours and are still, for we have more patients of our own than usual, and along with the dressings of these burned cases it keeps them trotting. I am proud of them, and it was most gratifying to have a woman like Miss Fitzpatrick say, 'You certainly have a very superior set of women. It has been a pleasure to know them, and it seems they have never been too tired to be courteous. If I were a younger woman, I would certainly join your ranks.' Then she spoke most enthusiastically of how much help the corpsmen had been.

"I wish I had a more ready pen, but some things are hard to describe. I can say with all sincerity that everyone worked hard, well, and long. Also, I had the pleasure of meeting some delightful women of my profession."

Miss Fitzpatrick writes:

"I have just returned from the naval hospital at Newport, where I have been for a few days helping to care for the poor victims of the *Mackinac* disaster. * * * It occurred to me that you might be interested to know how it all impressed an outsider.

"This was my first contact with the Navy, and I have never seen a finer spirit nor greater efficiency than displayed by the entire group—doctors, nurses, and corpsmen. The equipment at the hos-

pital was 100 per cent perfect; supplies were always on hand and in abundance.

"The story of the disaster is a very sad one. Over 600 men, women, and children sailed on the *Mackinac* for a day's outing at Newport. Shortly after the boat left Newport on the return trip there was an explosion and about 150 persons were burned, some of them most horribly. The death list has now reached 52, and the entire City of Pawtucket, where the majority of the victims reside, is in deep mourning. Had the accident occurred one-half hour later the story would have been a much sadder one. Happening as it did, directly in front of the naval hospital, relief was at hand immediately. There were 42 war ships in the harbor and all of them sent assistance and succeeded in getting the entire group of 600 passengers ashore in less than one-half hour.

"The chief nurse and her entire staff returned to duty and worked incessantly throughout the night, and to their credit I am told that every patient received first aid, and a bed was available for every patient who needed to stay. It all meant much rearranging, for I believe there were 225 naval patients in the hospital at the time. Relatives and friends of the injured ones were most kindly treated by every attaché of the hospital during the anxious days that followed, and everything done for their comfort.

"My own small part during the few days I was there was to help care for two of the more seriously burned patients. The Red Cross, under whose auspices I was sent to the hospital, did an excellent piece of work also. The entire State of Rhode Island is greatly indebted to the Navy for their help and assistance in this worst disaster of our history, and I am sure we will not forget it. It has made me realize how fortunate we are to have this excellent hospital in our midst. * * *

"The work done by the nurses of the Navy during this disaster was most heroic."

BOOK NOTICES

Publishers submitting books for review are requested to address them as follows:

The Editor,
United States Naval Medical Bulletin,
Bureau of Medicine and Surgery, Navy Department,
Washington, D. C.
(For review.)

DISEASES OF THE EAR, NOSE, AND THROAT, by *Harold Hays, M. A., M. D., F. A. C. S., Associate Otolaryngologist, City Hospital; Fellow of the New York Academy of Medicine, etc.* F. A. Davis Co., Philadelphia, 1925.

This volume, written by Dr. Harold Hays, is a modern and quite comprehensive work on these subjects. The book as a whole is written in a lucid and simple style that makes it attractive to the busy clinician who wants to get at the facts easily.

The chapters dealing with the ear impressed the reviewer as being the best of the book. In these chapters the author goes into the subject in a detailed way, giving the reader the benefit of a large clinical experience. The chapter on progressive deafness epitomizes very well all the available therapeutic measures now used for arresting or improving such cases.

The chapter on the nose and accessory sinuses, while bringing out nothing new, covers all the subject matter needed for a knowledge of the work. The chapters on the throat, larynx, and upper air passages are concise and give good general information.

The colored plates are one feature of the book that justifies criticism. The plates are nicely done, but hardly represent conditions as we see them in the human subjects. Figure 155 gives one the impression that the line of incision for paracentesis is in the anterior inferior quadrant in place of the usual and commonly adopted posterior inferior position.

PRACTICAL THERAPEUTICS by *Hobart A. Hare, B. Sc., M. D., LL. D., Professor of Therapeutics, Materia Medica, and Diagnosis in the Jefferson Medical College of Philadelphia; Physician to the Jefferson Medical College Hospital; etc.* Nineteenth edition. Lea & Febiger, Philadelphia, 1925.

An enlarged and revised edition of Hare's standard work on therapeutics in which the advances made in the knowledge of the use of drugs and the reasons for their use in various diseases are fully dis-

cussed. The use of insulin as an aid in the treatment of diabetics who do not respond satisfactorily to dietetic treatment alone is fully described. Intarvin, a fat containing an uneven number of carbon atoms, is recommended for use in place of the ordinary fats in those cases which can not be made blood-sugar free with insulin. Alcohol in small doses is advocated for elderly and middle-aged diabetics. Its use, in moderation, by elderly and weak individuals who are not suffering from diabetes is also recommended.

Hare's THERAPEUTICS has long occupied a high place in the esteem of physicians. This new edition will serve to increase its usefulness.

CLINICAL THERAPEUTICS, by *Alfred Martinet, M. D., Paris, France*. Authorized English Translation from the second revised and enlarged edition by *Louis T. de M. Sajous, B. S., M. D., Associate Professor of Experimental Pharmacology, School of Medicine, Temple University*. Complete in two volumes. F. A. Davis Co., Philadelphia, 1925.

A well arranged work of valuable information. This work consists of two volumes, 1,800 pages, and is divided into four parts.

Part 1 deals with therapeutic agents in which there are a classification of medicinal agents and a general consideration of drugs with their action on the different systems. Dietetics, physical remedies, and psychic agencies are also dealt with in a clear, concise, and systematic manner.

Part 2 deals with commonly employed therapeutic procedures with a clear description of each.

Part 3 deals with the treatment of symptoms.

Part 4 deals with the treatment of disease under the different systems together with an outline of the treatment of infectious diseases and metabolic disorders.

This work is thorough and complete and should be a valuable addition to one's library.

FUNDAMENTALS OF HUMAN PHYSIOLOGY, by *R. G. Pearce, B. A., M. D., Formerly Director of Medical Research Laboratory, Lakeside Hospital, Cleveland, Ohio; Formerly Assistant Professor of Physiology, University of Illinois, Chicago, Ill., and R. Macleod, M. B., D. Sc., F. R. S., Professor of Physiology in the University of Toronto*. Third edition. C. V. Mosby Co., St. Louis, 1924.

An excellent edition for the use of college students, especially those who are preparing for the study of other sciences, such as medicine, dentistry, pharmacology, and hygiene. This edition has 71 illustrations and 8 color plates. The text is clear and concise, and the book is to be recommended for the use intended by the authors.

THE DIAGNOSIS OF CHILDREN'S DISEASES, by *Professor Dr. E. Feer, Director of the University Children's Clinic, Zurich, Switzerland*. Translated by *Carl A. Scherer, M. D., F. A. C. P.* J. B. Lippincott Co., Philadelphia.

An excellent translation of a carefully compiled and well illustrated edition of one of the most difficult and important branches of medicine. This book confines itself entirely to the diagnosis of disease in the child, with special attention to the ills of the newly born and of infants. Treatment is not considered, except where it is essential for diagnosis.

In this work symptoms are described and the diseases and conditions in which they occur or may occur are enumerated.

An exceedingly valuable book for the general practitioner as well as the specialist.

THE NORMAL DIET, by *W. D. Sansum, M. S., M. D., Director of the Potter Metabolic Clinic, Santa Barbara, Calif.* The C. V. Mosby Co., St. Louis, 1925.

The author describes his book as "a simple statement of the fundamental principles of diet for the mutual use of physicians and patients." As such, it covers the ground very well.

The subject is discussed under seven headings:

1. The caloric requirements of the body.
2. The protein requirements of the body.
3. The bulk requirements of the body.
4. Acidosis.
5. The mineral requirements of the body.
6. The water requirements of the body.
7. The vitamin requirements of the body.

All of these are discussed in such a way as to be easily understood by any intelligent patient and, at the same time, to bring to the mind of the physician many points of practical value.

DIABETES: ITS TREATMENT BY INSULIN AND DIET, by *O. H. Petty, M. D., Professor of Diseases of Metabolism, and W. H. Stoner, M. D., Associate Professor of Biochemistry, Graduate School of Medicine, University of Pennsylvania*. Second edition. F. A. Davis Co., Philadelphia, 1925.

This is one of the most valuable of the small books intended to be used by the diabetic, not in treating himself but as an aid to him in carrying out the instructions of his physician.

In discussing insulin the authors are careful to state that it is not a cure for diabetes but only a help to those whose diabetes is so severe that a carefully regulated diet alone is not sufficient to keep them in good health and to maintain their efficiency. They also warn against the many preparations now on the market which claim to be "just as good as insulin" and which may be taken by mouth.

Many useful food tables are given, as well as recipes for the preparation of tasty articles which will add variety to the diabetic's diet.

AN INDEX OF TREATMENT, by Various Writers, edited by *Robert Hutchison, M. D., F. R. C. P., Physician to the London Hospital, and James Sherren, C. B. E., F. R. C. S., Surgeon to the London Hospital.* Ninth edition. William Wood & Co., New York, 1925.

To cover the entire field of medicine in one book is an enormous task. However, that is what the editors of this volume of more than 1,000 pages have attempted. It is intended for use by the general practitioner who has not the time nor opportunity to consult a reference library. For this reason the elaborate operations requiring special surgical ability for their performance are not described. As a ready reference book for the average physician, it will prove useful, and that the information contained in it is authentic is attested by the names of the contributors, the list reading almost like a directory of the leading physicians and surgeons of Great Britain.

SOME FUNDAMENTAL CONSIDERATIONS IN THE TREATMENT OF EMPYEMA THORACIS, by *Evarts A. Graham, A. B., M. D. Member of Empyema Commission, U. S. Army; Professor of Surgery, Washington University School of Medicine, etc.* The C. V. Mosby Co., St. Louis, 1925.

No attempt is made to cover the field of empyema in an exhaustive manner in this book. It is devoted principally to certain principles of treatment and the physiological facts upon which they are based. Much space is given to the important details of when to operate and what operation to perform. The author dwells on the necessity of managing empyema in such a manner that collapsing operations may become more rare. Essential points in the treatment are careful avoidance of open pneumothorax in the acute pneumatic stage; prevention of a chronic empyema by rapid sterilization and obliteration of the cavity; careful attention to the nutrition of the patient.

This is a most valuable book so far as it goes. The reviewer ventures to express the hope that Doctor Graham will some day bring out a book covering the whole subject of empyema. There is need of such a book and he is the man to do it.

This essay was awarded the Samuel D. Gross prize of the Philadelphia Academy of Surgery in 1920.

THE VERTEBRATE SKELETON FROM THE DEVELOPMENTAL STANDPOINT, by *J. S. Kingsley, Professor of Zoology, Emeritus, University of Illinois.* P. Blakiston's Son & Co., Philadelphia, 1925.

An outline of vertebrate osteology which traces the skeletal elements from their early appearance to the adult condition. The BNA terminology has been followed in most cases but sometimes

other terms are used for parts lacking in the adult human skeleton.

There is an appended bibliography of nearly a thousand books and papers, selected for collateral reading.

DISEASES AND DEFORMITIES OF THE FOOT, by *John Joseph Nutt, B. L., M. D., F. A. C. S., Professor of Orthopedic Surgery, Polyclinic Medical School and Hospital; Member of the American Orthopedic Association, etc.* Second edition, completely revised. E. B. Treat & Co., New York, 1925.

This useful monograph on the diagnosis and treatment of diseases of the foot presents, in a very practical way, the most modern orthopedic methods.

The various chapters cover the anatomy, physiology, methods of examination, weak foot, clubfoot, paralysis, tuberculous and gonorrheal disease, and proper apparel for the foot. The chapter on minor ailments will probably be of most value to the average practitioner and one wishes that these minor but most frequent troubles could be discussed at greater length.

It will be a useful book for the practitioner who has an occasional orthopedic patient.

GYMNASTICS IN EDUCATION, by *William J. Cromie, Sc. D., Assistant Director of Physical Education, Director of Summer School Courses, Department of Physical Education, University of Pennsylvania.* Lea & Febiger, Philadelphia, 1925.

This one of The Physical Education Series edited by Dr. R. Tait McKenzie, Professor of Physical Education and Physical Therapy in the University of Pennsylvania, deals with the subject of Physical Education by Gymnastics. It is intended for use by instructors in schools and colleges and should prove valuable to them in their work as its text is clear and concise and its illustrations practically self-explanatory.

The various chapters discuss gymnastic tactics, of which the author says: "Concentration and power of attention, rapid and accurate response to command are acquired and developed by tactics as by no other means * * *"; gymnastic free work; calisthenics; wands; Indian clubs; heavy apparatus and bars; rings; mat work, which is said to develop every part of the body more quickly than most other forms of exercise; and classification of games and relay races.

Although many of the exercises described require elaborate apparatus and could not be carried out on board ship, a knowledge of their performance would be of value to those who have to do with the physical education of recruits in the Navy.

THE DIVISION OF PREVENTIVE MEDICINE

Lieut. Commander J. R. PHELPS, Medical Corps, United States Navy, in charge

Notes on Preventive Medicine for Medical Officers, United States Navy

REPORT OF BOARD APPOINTED BY THE SECRETARY OF THE NAVY TO STUDY THE VENEREAL-DISEASE PROBLEM OF THE NAVY

Last December, upon recommendation of the Surgeon General of the Navy and by direction of the Secretary of the Navy, a board of officers was convened by order of the Chief of the Bureau of Navigation to study the venereal-disease problems of the Navy. The officers composing the board represented the Bureau of Navigation, the office of the Major General Commandant, United States Marine Corps, office of the Judge Advocate General of the Navy, and the Bureau of Medicine and Surgery.

The board made a careful study of such evidence as it could obtain relative to venereal-disease conditions in civil life and among personnel of the Navy, held frequent meetings over a period of several months for discussion and for consultation with representatives of official and unofficial agencies and finally submitted a report embodying its conclusions and containing certain specific recommendations which, in the opinion of the board, if adopted will lead to definite improvement in the venereal-disease situation in the Navy.

With departmental permission the report is printed herein. It should be of interest to all medical officers irrespective of their opinions and any conclusions they may have reached regarding the management and control of venereal diseases. The report follows:

Report of board appointed to study the venereal-disease problems of the Navy

In compliance with orders the board began its studies by considering the facts regarding the prevalence and the damaging consequences of venereal diseases in the Navy as set forth in the Annual Report of the Surgeon General of the Navy for the year 1924. The board then arranged for and held a series of conferences with representatives of governmental and unofficial agencies to familiarize

itself as fully as possible with venereal-disease problems and related sociological conditions in civil communities of the United States.

Among those with whom matters properly to be considered by the board were freely discussed, the following represent certain organizations which have long been engaged in careful study of all phases of the venereal-disease and allied problems, as well as others concerned with certain special social problems which bear directly upon the Navy's problems:

Asst. Surg. Gen. Mark J. White, chief of the division of venereal diseases, Bureau of the United States Public Health Service.

William F. Snow, M. D., general director of the American Social Hygiene Association.

Walter M. Brunet, M. D., director, department of medical measures, the American Social Hygiene Association.

Valeria H. Parker, M. D., director, department of protective measures, the American Social Hygiene Association.

Katharine B. Davis, Ph. D., general secretary, Bureau of Social Hygiene, New York City.

Mrs. Mina C. Van Winkle, chief of the women's bureau, Police Department of the District of Columbia.

Mrs. Jane D. Rippin, representing the Girl Scouts of America.

Miss Abby Condit, representing the Playground and Recreation Association of America.

Dr. Valeria Parker, representing the president of the National Congress of Parents and Teachers.

Miss Winifred Callahan, Women's Protective Association, Cleveland, Ohio.

PREVALENCE OF VENEREAL DISEASE EVERYWHERE A SERIOUS PROBLEM

As a result of its studies and the information obtained through conferences with civilians and well-informed officers of the Navy, the board is convinced that the venereal diseases constitute a very serious menace to the public health in practically all civil communities as well as in the Navy. It is, of course, with the Navy's problems that the board is primarily concerned, but those problems can neither be thoroughly understood nor effectively dealt with unless consideration is also given to the conditions as they exist in the homes and institutions of the Nation.

PREVALENCE OF VENEREAL DISEASES IN THE NAVY

The statistics published from year to year by the Surgeon General of the Navy show that all three of the venereal diseases are usually to be found among the first six of all diseases which cause disability

and require admission to the sick list. How many more men are infected each year than the figures indicate is a matter for conjecture, but the board believes that admission rates for the venereal diseases in the Navy would be considerably higher if all cases could be recorded. In many instances men infected with chancroid or gonorrhea can successfully conceal their diseases, especially if they are so situated that they can have daily liberty under conditions which make it possible for them to consult civilian physicians or quacks or treat themselves with medicines purchased in drug stores with or without the advice of drug clerks or friends in or out of the Navy. Relatively speaking, gonorrhea is in many cases easily concealable, for, while complications occur in a certain proportion of the cases and involve serious disability or lead to uncured or incurable conditions, the fact remains that the infection is of brief duration and does not incapacitate the individual in an obvious manner in many other cases. Most cases of syphilis, on the other hand, are likely to be discovered ultimately, because the infection persists or tends to persist without adequate treatment throughout the life of the individual.

In so far as the statistics collected by the Bureau of Medicine and Surgery indicate, about 12.5 per cent of the personnel of the Navy becomes infected with venereal diseases each year. Excluding officers, among whom, of course, admission rates are much lower, it appears that in an average year from 13 to 14 per cent of the enlisted men become infected. About one-half of 1 per cent of the entire personnel is on the sick list constantly as a result of venereal disease, but this figure is comparatively small, because much of the treatment for these diseases, even for syphilis, is given while the men affected are not being carried on the sick list. About 20 per cent of the men who receive treatment on board ship from day to day are treated for venereal diseases or complications arising from these diseases.

ADMISSION RATES NOT UNIFORM THROUGHOUT THE NAVY

The table following shows how unevenly admissions are recorded in different naval organizations and forces serving in different parts of the world. The figures were taken from the Annual Report of the Surgeon General of the Navy for 1924 and they cover the calendar year 1923.

Population group	Per cent of men attached who became infected during the year 1923
All ships.....	15.3
Battleship divisions—	
Battle Fleet.....	9.2
Scouting Fleet.....	11.6
Asiatic Fleet.....	47.7
Destroyer squadrons—	
Battle Fleet.....	7.1
Scouting Fleet.....	16.7
Asiatic Fleet.....	42.0
Miscellaneous vessels—	
Battle Fleet.....	13.0
Scouting Fleet.....	15.4
Asiatic Fleet.....	38.6
Naval forces, Europe.....	25.7
Special service squadron.....	28.3
Naval transportation service.....	20.0
Ships on special duty; survey duty; ships on shakedown cruises, etc.....	11.1
All forces ashore in the United States.....	6.8
Navy yard, Boston, Mass.....	6.3
Receiving ship, Boston, Mass.....	15.7
United States Naval Torpedo Station, Newport, R. I.....	5.3
United States Naval Training Station, Newport, R. I.....	4.2
Navy yard, New York, N. Y.....	6.8
Receiving ship, New York, N. Y.....	9.8
United States submarine base, New London, Conn.....	8.4
Navy yard and marine barracks, Philadelphia, Pa.....	6.0
Receiving station, Philadelphia, Pa.....	17.5
United States Naval Air Station, Washington, D. C.....	5.1
United States Naval Air Station, Hampton Roads, Va.....	6.1
United States Naval Training Station, Hampton Roads, Va.....	7.7
Receiving ship, Hampton Roads, Va.....	8.2
Navy yard, Norfolk, Va.....	6.8
Marine barracks, Quantico, Va.....	7.1
Marine barracks, Washington, D. C.....	4.9
Navy yard, Washington, D. C.....	5.9
Receiving ship, Charleston, S. C.....	16.9
Marine barracks, Parris Island, S. C.....	4.3
United States Naval Station, Key West, Fla.....	6.5
United States Naval Station, New Orleans, La.....	6.0
United States Naval Air Station, Pensacola, Fla.....	6.2
United States Naval Training Station, Great Lakes, Ill.....	8.8
United States Naval Air Station, San Diego, Calif.....	6.8
United States Naval Training Station, San Diego, Calif.....	4.4
Marine detachment, San Diego, Calif.....	3.1
United States Naval Station, Mare Island, Calif.....	4.4
Receiving ship, San Francisco, Calif.....	18.5
United States Naval Torpedo Station, Keyport, Wash.....	7.0
Navy yard, Puget Sound, Wash.....	4.3
Receiving ship, Puget Sound, Wash.....	13.6
Expeditionary Forces, Haiti.....	23.7
Expeditionary Forces, Dominican Republic.....	22.2
Naval personnel, Virgin Islands.....	9.7
Naval personnel, Panama Canal Zone.....	18.8
United States Naval Station, Guantanamo Bay, Cuba.....	11.5
Marine guard, legation, Managua, Nicaragua.....	25.0
Marine guard, legation, Peking, China.....	40.1
Naval personnel, Territory of Hawaii.....	3.4
Naval personnel, Philippine Islands.....	12.8
Naval personnel, Guam.....	2.9

Doubtless, conditions are favorable in and around a few of the stations in the above list for a low incidence of venereal diseases, but it is not unlikely that conditions making it possible for men to conceal infection partly account for the low rates reported by some of the stations.

DANGEROUS CONSEQUENCES OF GONORRHEAL AND SYPHILITIC INFECTIONS

The board is very much impressed with the evidence before it regarding the serious consequences which often follow infection with syphilis and less frequently, gonorrhea. Careful consideration was given to information previously published by the Surgeon General of the Navy and to statements made in conference by Asst. Surg. Gen. Mark W. White, of the United States Public Health Service, and by Dr. William F. Snow, formerly executive officer of the California State Department of Health and now general director of the American Social Hygiene Association. So much has been published in recent years relative to the effects of both diseases on personal, family, and community health and welfare that the board considers it unnecessary to review such evidence at length. It is desirable, however, in this report to mention that a number of deaths occur in the Navy every year from heart disease and affections of the brain with syphilis as the underlying cause, besides the deaths caused by this disease directly while the victims are undergoing treatment. It is, of course, impossible to estimate how many men die prematurely after leaving the Navy from the direct and indirect consequences of syphilis. In 1923, 17 men still in service were admitted to the sick list with general paresis and 7 with locomotor ataxia. Only one patient died during the year, but the average duration of life after the development of paresis is but little more than two years. The possible disasters which may be caused by an officer or enlisted man in the early stages of paresis, before his condition has been recognized, are to be borne in mind.

INSUFFICIENT DATA FOR COMPARISON WITH CIVIL LIFE OR OTHER MILITARY ORGANIZATIONS

The board endeavored to obtain data which might serve as a basis for comparison between the known prevalence in the Navy and the prevalence of venereal diseases among the civil population of the United States, particularly among males, in comparable age groups. As expected, it learned that such figures are not to be had, but for the purposes of its study it seemed desirable to seek the information and mention in its report that the reporting of venereal diseases in civil communities is too incomplete to make statistics based on such reports of any practical value in estimating prevalence. A number of surveys have been made in selected population groups in certain institutions and among employees of some industrial companies, but so far as the board could ascertain no information of any definite value for purposes of comparison is to be derived from such studies. However, it is apparent and generally recognized by physicians,

public health officials, and unofficial organizations which have studied venereal disease problems that syphilis and gonorrhea are widely prevalent in practically all communities and that persons in all classes of society become infected.

The board is loath to consider comparisons between the vital statistics of the Navy and other military and naval organizations, because it has no evidence that the statistics available have been collected under similar conditions and compiled by comparable statistical methods. In the United States Navy the instructions relative to the reporting of the venereal diseases contemplate that every case of venereal infection be recorded as a case of venereal disease, even if there be apparent no disability whatsoever. This practice is different from that generally carried out in the recording of sickness where the principal criterion is the existence of a certain amount of disability which definitely indicates that the individual should be placed on sick report. In some statistical reports the numbers of cases of gonorrhea and other forms of gonococcus infection recorded are but little greater than the numbers of cases of syphilis, and it is doubtful whether, in the compilation of such statistics, cases of gonorrhea not attended by disabling symptoms have been recorded.

It is not the purpose of the board to minimize the seriousness of high venereal disease admission rates in the United States Navy. On the contrary, it is the desire to face the facts as they exist, or as accurately as they can be ascertained, that leads to the above considerations in order that the impression shall not be given that because the rates are higher than those reported for the armies and navies of other countries it should be regarded as probable that the rates for our Navy are based on complete detection and recording of these diseases.

VENEREAL DISEASE RATES NOT A GAUGE OF PREVENTIVE ACTIVITIES

Knowledge of conditions as they exist throughout the Navy leads the board to believe that in spite of the large numbers of cases reported every year many cases have escaped detection, and some known cases have for various reasons not been entered upon official returns. It is understood that the Bureau of Medicine and Surgery is endeavoring to secure complete detection principally in order that as few men as possible may fail to receive adequate treatment and the necessary follow-up treatment to prevent recurrences and future damage to the individual. In this connection the board is glad to record its opinion that this is the only common-sense method of approaching this important phase of the venereal disease problem—the management of infected individuals. It feels that only concealment of disease and concealment of exposure should be pun-

ishable. It believes that measures applied after the individual has become infected which smack of punishment for having become infected or tend to lessen the individual's self-respect or lead him to believe that he is not being treated on even terms with the victims of any other kind of disease, must inevitably tend to make men conceal disease and seek treatment elsewhere. The board also believes that no organization, on the basis of its venereal disease statistics, should be judged with regard to the interest displayed by its commanding officer and other officers in the initiation and prosecution of efforts to prevent and control venereal diseases. Under present conditions, it appears, a high admission rate is quite as likely as a low rate to indicate a desired display of interest, confidence among the crew in the medical officer, and the attainment of a most desirable objective—namely, that infected men receive good treatment.

It seems reasonable to conclude that any tendency to hold the commanding officer responsible for the size of the venereal disease rate must indirectly lead to concealment of disease, and even failure to report disease when discovered. The board deems it advisable to touch upon these points because it understands that just such methods have been advocated. Moreover, certain punitive measures of doubtful value are still in effect in the Army and Navy. In view of the fact that the commanding officer of an organization has no control whatever over at least some of the conditions and circumstances of determining importance which cause men to become infected, it is obviously unwise and unjust to attempt to hold him responsible for the number of men who become infected. Low admission rates of course might logically be expected from so doing, but that would defeat the aims of those interested in curing as well as preventing disease. The board has no reason to believe that punishment of an individual for having acquired a venereal disease has enough preventive value for him or for others not infected to compensate for the harmful consequences of making routine use of such punitive measures.

It is, however, rational for the Navy Department to adopt such measures as by general agreement can be expected to have definite value without unduly conflicting with other preventive measures or with naval efficiency in general, and then hold commanding officers specifically responsible for their enforcement by regulation or general order.

PREVENTION OF VENEREAL DISEASE NOT EXCLUSIVELY A MEDICAL PROBLEM

From the evidence before it the board concurs with the statement made in the Annual Report of the Surgeon General of the Navy for 1924 that much of the work required under a well-planned and well-

executed program for the prevention and control of venereal diseases is not medical in character. In referring to activities which are ordinarily beyond the scope of the Medical Department of the Navy the Surgeon General mentions discipline, athletics, recreation, social service, police work, cooperation with the police and protective social agencies in civilian communities, with churches and with various women's organizations which can be led to take an interest in the entertainment and welfare of the enlisted men.

SOCIOLOGICAL AND PSYCHOLOGICAL CONSIDERATIONS

At this point it may be well to review briefly the more important conditions and influences that make for a high prevalence of venereal disease. The Navy recruits its men from civil life. They have variously good and bad mental qualities, depending upon inheritance and the various environments from which they came. The primary purpose in recruiting is to select men who are physically and mentally capable of performing efficiently the different kinds of work required in the modern Navy. Some of the work demands great physical strength but comparatively little intellectual capacity. On the other hand, some of the work which must be performed by enlisted men requires superior intelligence.

The general and special requirements of essential naval activities govern the selection of recruits and the special training subsequently given them. In the recruiting office men with criminal records are not considered eligible for enlistment in any rating, and no man is accepted without reasonable assumption that he is of good moral character. Nevertheless, many of the men enlisted must prove wanting in the finer qualities of moral and ethical character. That is not primarily the fault of the Navy. The fault lies with the youth of America; that is to say, primarily with the parents of America. What happens to men in the Navy in the way of disease arising from their own misconduct is very largely due to faulty training in childhood and adolescence and dangerous environments in which parents so often permit their children to grow up without recognizing fully apparent dangers and without checking the formation of bad habits. Too often parents passively permit their children, in accordance with the tendency of the times, to follow any means pleasing to vanity—of letting themselves go in the endeavor to give free expression to the ego, satisfy natural instincts and cravings, and avoid repressions. It is not to be wondered at that many children experience sex relations and become sexually promiscuous at an early age. It is not to be expected that discipline in the Navy will overcome the lack of discipline and restraint in earlier years to the degree that young men who have not learned to control their desires, or

at least to temper them with judgment, can be trusted to avoid dangerous contacts while on liberty away from naval jurisdiction and supervision.

It is therefore fundamentally true that the Navy's venereal-disease problem is as bad as it is largely because of the lack of suitable training and proper restraint of children in the homes of the United States, and because of defective social hygiene in high as well as low levels of society in practically all communities. It is perfectly obvious—and yet to many who hear it for the first time it seems like a new idea—that the venereal diseases which the Navy must treat are acquired in civil communities under circumstances which are for the most part beyond control of the Navy.

SPECIAL FACTORS INVOLVED UNDER SERVICE CONDITIONS

It is true, as often pointed out, that the Navy takes young men from their homes and places them where they will be exposed to temptation. That is an essential service condition. The same thing might be said of a university located in a large city. The Navy doesn't expose its men to temptation, but it must grant leave and liberty in foreign as well as home ports. Otherwise it could not maintain contentment and a high state of morale and it could not induce young men to enlist.

While these men were living in their home communities, although in many cases they were surrounded with opportunities for making dangerous contacts with immoral women, they were influenced in various degrees by family considerations, the opinion of neighbors, employers, and acquaintances, and at all times they had ample opportunity to associate with young women of good character. Often the bluejacket is nearly or entirely free from all such deterring influences while he is on liberty. His behavior may be known only to those who accompany him into a red-light district, although eventually a man is likely to be known by the company he keeps. The man's behavior, while depending in part upon his previous habits and early training, is bound to be influenced greatly by his feeling of freedom, by his associates in the Navy, and by the company he falls in with while on liberty.

INFLUENCE OF UNDESIRABLE CHARACTERS

His associates in the Navy may not be of the best. In every organization there are likely to be at least a few undesirable characters. Men of this kind often exert a pernicious influence on other men. Asst. Surg. Gen. Mark W. White, of the United States Public Health Service, in discussing this phase of the venereal disease prob-

lem referred to such men as "sex addicts," and stated that they are to be found in colleges as well as among other groups of young men. They are thinking constantly about sexual contact, and like drug addicts they try to induce other men to join them in their pursuits. There is nothing peculiar about the mere tendency to recruit followers. It is natural for a man who takes up golf, or joins a gun club to shoot clay pigeons, or follow any other desire, to do the same thing. But in the case of the man who is trying to get up a party to go and meet the prostitutes he knows, or in a foreign port to visit the red-light district, there may be an ulterior motive. He can often borrow a dollar or two from this man and that man whom he has induced to accompany him, without any intention of returning the money, and thus in part defray his own expenses.

Such men are likely to have other characteristics as well that make them undesirable or of relatively little value to the Navy. They can be recognized by men of the better sort among the crew, even if they do not happen to be suspected by their officers. The board believes that the detection and elimination of men of this kind is an important measure in the interests of venereal disease prevention, and that much can be accomplished by seeking the cooperation of chief petty officers and right-thinking members of the crew with a view to cultivating a public opinion in the organization that condemns flagrant misconduct. If the better element in the crew is induced to take an active part in improving conditions instead of remaining passively tolerant and merely refusing to associate ashore with men whose habits are considered bad, the latter will become more conspicuous on board ship, and furthermore some will change their habits for the better. Public opinion can be made to exert a profound influence in any organization. Many men will adopt or lapse into bad habits if they observe that such conduct is the rule in the group or is tolerated by public opinion. On the other hand, many men who do not themselves feel that there is any particular reason, moral or otherwise, why they should not seek recreation chiefly in the company of commercial prostitutes may be deterred from such associations by the realization that the majority of men are cultivating acquaintances only among young women who are virtuous, or at least ostensibly virtuous, and particularly by efforts of the crew to keep the ship, navy yard, landing dock, and places where ship entertainments are given clean enough to justify those who are in a position to do so to entertain their mothers and sisters. The principle involved is that men are restrained from doing certain things as much by the knowledge that such things simply are not being done in the group as by any innate sense of what is proper or improper.

BAD EFFECTS OF FOUL AND OBSCENE LANGUAGE

The amount of foul and obscene language used on board a ship is an index of the state of prevailing public opinion on that ship. Any general tendency to use such language can be broken up promptly by concerted and well-directed efforts on the part of the ship's officers and the award at mast of adequate punishment. The use of filthy language should be discouraged, because, if tolerated, many men who are not really of bad character carelessly form the habit of punctuating their daily conversation with terms which are commonly employed by uneducated persons in referring to the sexual act or to perverted practices. The principal reason why such language should not be permitted is that the habit spreads, and men of bad character who should be detected and suppressed or eliminated are not so conspicuous as they should be. Furthermore, the habit of using such language is not consistent with self-respect or high moral standards.

INFLUENCE OF IMMORAL WOMEN

Fundamentally, of course, the urge to sexual intercourse arises from the primary instinct of procreation. And the urge is powerful in both sexes. To overlook the fact that the female of the species as well as the male is activated by strong emotions arising from the sex instinct is to overlook important causes involved in the spread of venereal disease. From a practical standpoint, nature does not impose the same possible consequences of illicit intercourse upon the male as upon the female, and women are ordinarily held in more restraint by conventions and social attitudes. In general, too, a greater proportion of women than men in all comparable social groups are striving for high ideals. Paradoxically, the attitude of the male sex is in part responsible for this requirement. Nevertheless, in large centers of population, where the doings of the individual are more or less lost sight of, there seems to be a growing tendency on the part of young women who have reached a state of economic independence to break away in greater or less degree from the strict requirements of previous generations. Often, from the nature of things, life in a large city is such that freedom of opinion and action in giving expression to the feeling that single women are entitled to freedom in social and sexual as well as business relations does not bring the opprobrium that would follow in a smaller community. Such women are not necessarily promiscuous in their relations with men.

In comparatively small as well as large communities there are to be found other women who are promiscuous in their sex relations.

These range in age from those who are mere girls in their early teens to mature women, and they comprise all classes of clandestine prostitutes. With some the sexual act is more the expected result of an evening's entertainment in a dance hall or elsewhere in the course of which both the man and the girl feel free to do as they please, rather than any desire on the part of the latter for profit.

In some cases the desire for gifts of clothing, cheap jewelry, etc., is a factor, and in other cases the principal or only consideration is money.

CURIOSITY AN IMPORTANT FACTOR

Curiosity is a psychological factor of great importance. The child is curious from an early age, and the desire to satisfy curiosity increases as he grows all the way into maturity when habits are fixed and inhibitions fully developed. With the growing child the difficult but proper thing is to satisfy curiosity about sex matters with truthful information without volunteering more information than is required and without further stimulating curiosity and imagination at the moment. The young man will determine for himself how and when to satisfy his curiosity, and his imagination can not be checked.

In the case of young men in the Navy, curiosity is doubtless an important factor making for the large numbers of exposures to venereal disease that occur under certain conditions such as during liberty in a foreign port where vice is uncontrolled. At such times experience has demonstrated that warning and instruction carefully given regarding the nature of venereal diseases, the danger of infection, and appeals to think of the possible effects of disease upon future career and after life, have failed to deter, and so far as could be judged more men could not have exposed themselves if such teaching and warning had not been given.

The men have heard all sorts of tales about foreign women, and it appears that they will satisfy their curiosity when occasion permits. When, in addition to the factor of curiosity, we find that many prostitutes are waiting for the men near the dock, or are ready to pick them up as soon as they have entered the crowded streets of the city, that taxicab drivers are agents for houses of prostitution, that brothels have their runners everywhere to intercept the men, and peephole displays, etc., are held out as an inducement to stimulate curiosity, it is not surprising that the exposure rate is very high during the visit of a ship to such a port.

In our own seaboard cities conditions are not so bad. In some, prostitutes, at least women who openly profess to be prostitutes, are scarce and more or less difficult for the men to find. The lure is ordinarily not so great as in a foreign port, and the comparative

absence of street walkers makes it necessary for the men deliberately to hunt for them. Therefore there is not so much likelihood of wholesale curiosity being aroused. Nevertheless, even in a home port with which the men are thoroughly acquainted and after a considerable stay, bluejackets will be found standing on street corners with apparently nothing to do and no place to go, following with their eyes every young woman who passes, until after a time, curiosity, imagination, and desire have so stimulated sex feelings that before the evening is over they will endeavor to satisfy their desires.

The above considerations suggest certain remedial measures which it should be possible and practicable to put into effect; but before discussing them it is desirable briefly to discuss other related factors in order that all conditions which may possibly be corrected or improved may be considered together.

VALUE OF RECREATIONAL FACILITIES

It follows from what has just been said that lack of recreational facilities is an important factor in leading men to hunt for prostitutes when with some definite, interesting, and agreeable means of entertainment before them as they start out on liberty their thoughts might not turn directly to women of low moral character. In this sense we do not mean recreational facilities in general, but, in particular, some desirable place to go and something in fact to do while the man is on liberty that will be recreational in character. Large cities usually have everything necessary to interest and entertain the man no matter what mood he is in so long as he has money to spend. That is probably one reason why venereal disease rates are lower in some of our larger ports, in spite of the fact that prostitutes are more easily to be found, than when liberty is granted in certain smaller cities.

Variety of means for spending time ashore is of considerable importance, but this does not cover the whole problem. All inducements of a proper character of course are desirable—ball games, boxing matches, theaters, enlisted men's clubs, Y. M. C. A. buildings, etc., and some of the men will be content most of the time with such things, together with sightseeing or visits to museums and libraries, but with most of the men part of the time or much of the time there will be a longing for the companionship of women which they will satisfy by meeting women of bad character if they can not meet women of good character. Living apart from women naturally has the effect when they do get away from the sound of the bugle and boatswain's pipe and clatter of mess gear, to make more imperative the demand for conversation and banter with the opposite sex even if nothing more than innocent fun and harmless flirtation is intended.

The Navy can not properly safeguard the health of its men without taking these needs of the human mind into consideration.

CONTENTMENT ON BOARD SHIP HIGHLY DESIRABLE

Conditions on board ship sometimes have considerable bearing on the rate of exposure to infection. In a happy ship men will often stay aboard when they are entitled to liberty, because if they are at peace with themselves, and the crew as a whole is contented, they can always find something interesting and worthwhile to do. On the other hand, in an unhappy ship they will neglect no opportunity to get away from it all for a time as often as they can, and if they have nothing else to do they will idle away the time on street corners.

The provision of facilities for recreation on board ship in addition to gear for athletics is important in this connection, of course, but the board believes that phase of the problem is already well covered from the standpoint of promoting morale, contentment, and physical efficiency. Of course, recreational facilities on board ship and at naval stations, while they may induce many of the men to spend more time within the command than they would otherwise, do not have any effect in preventing dangerous contacts while the men are on liberty.

The relation between liberty and pay day, especially the first liberty in a port, has a good deal to do with the number of exposures that occur. For example, a battleship which had spent several weeks in New York, her home port, with comparatively few exposures as shown by the records of prophylaxis, and few cases of disease, went into Hampton Roads on a pay day. Liberty was granted every day during the three days the ship was in port. More than three times as many prophylactic treatments were given as during the much longer stay in New York.

DEPRIVATION OF LIBERTY IN RELATION TO THE PREVENTION AND CONTROL OF VENEREAL DISEASE

The question of restricting men to the ship or station while they are infected with venereal disease requires some discussion. As a general principle the policy of restriction is sound, and there can be no question that a syphilitic with unhealed sores in the mouth or on the skin should not be permitted to expose other persons to the danger of contracting disease by contact with him or with articles, including eating and drinking utensils, which may be contaminated by him. On the other hand, most cases of syphilis and many cases of gonorrhea are of long duration, and the patient with either disease may continue for a long time in such a state that he may transmit the

infection through sexual intercourse, although there may no longer be any likelihood that he will infect anybody in any other manner.

The last paragraph of General Order No. 69 of September 16, 1921, provides that, "Men under treatment for venereal disease shall not be granted liberty while in an infective stage except in case of urgent business or imperative personal necessities." The term, "Infective stage" can be construed variously by the medical officer, who ordinarily must decide in each case whether the disease is or is not in an infective stage. Thus, without guiding instructions or supplementary definitions there is likely to be, and the board believes there has been an undesirable lack of uniformity in depriving men of liberty consequent to infection with venereal disease. So far as the board knows the department has never undertaken to define more accurately the conditions under which men should be deprived of liberty after becoming so infected.

The board feels that it is always a serious matter to deprive men of liberty under the conditions of naval life. Such deprivation more often than not is in itself severe punishment, because regular liberty or the opportunity to go on regular liberty, especially after cruise and work periods, is highly prized. Not infrequently restriction to the ship during an entire liberty period or for the greater part of an overhaul period has a most depressing effect on restricted individuals and often leads to absence without leave and even to desertion.

Furthermore, the knowledge that he will have no more liberty during the ship's stay in port, or for some time to come in the case of a man attached to a shore station, more than any other immediate consequence of infection leads to concealment of the disease when concealment is possible. The board believes that when disease has been acquired it is of very great importance for the good of the Navy as well as of the individual that the man should be placed under proper treatment as promptly as possible, and that such measures as are necessary or advisable to protect the health of other men should be applied.

OPINIONS OF THE BOARD REGARDING GENERAL INSPECTIONS OF CREW FOR THE DETECTION OF VENEREAL DISEASES

Theoretically, any concealment of disease should be prevented by regularly inspecting the crew for venereal disease. In practice it is not altogether a simple matter to detect disease in the course of general inspections. The board understands that most medical officers of the Navy are of opinion that occasional surprise inspections may result in the detection of an occasional case of disease but that regular inspections are not altogether practicable. The board believes that any good that may come from inspections of the personnel at regular intervals is, in general, outweighed by the

bad effect on morale. It is recognized that inspections may be indicated under special conditions, such as to determine the physical fitness of men for special duty, to go with the landing force, or on an expedition, etc. Periodical examination of food handlers employed in the galley and of messmen and mess attendants is also conducted on another basis—namely, for the detection of any communicable disease which may make the individual as a handler of food dangerous to the health of other persons in the Navy.

General inspections of the crew for venereal disease are resented by many men, particularly by married men and men of the better type. Further resentment is caused if married men are excused. Inspection of the crew of a large ship or station requires much time if it is to be carried out thoroughly, and if the examination of each man is not deliberate and careful some cases of gonorrhea and syphilis are likely not to be discovered. Every case missed tends to weaken confidence in the ability of the medical officer. Not infrequently when a man fears he is infected and seeks examination, long and careful study is required before a conclusion can be reached. The board believes that practically complete detection of venereal diseases can be secured by promoting confidence in the Medical Department and a feeling among the crew that just treatment and good treatment will be accorded all men so infected. It believes if conditions are satisfactory in these respects that chief petty officers and other members of the crew will see to it that men who are inclined to conceal disease will be brought to the attention of the medical officer. The board believes, however, that the question whether to inspect or not is one to be decided by the commanding officer of the organization, and that it should merely discuss the question on its merits from the evidence considered.

REVISION OF GENERAL ORDER REGARDING RESTRICTION OF VENEREAL-DISEASE PATIENTS RECOMMENDED

With further regard to the question of restricting men to the ship or station while under treatment for venereal disease, the board believes that some modification of the requirements of General Order 69 should be made. This is another matter in which it is believed the commanding officer's judgment should play a definite part. A requirement that leads to the concealment of disease is undoubtedly bad, and if it leads to mental depression, disaffection, and thoughts of desertion it is still worse. On the other hand, there are situations where enlisted men, in spite of their promises, will have intercourse with women who for the most part limit their relations to enlisted men of the Navy, so that the result of granting liberty may be more or less direct spread of disease to other men

in the Navy. The situation may be different with two or three ships undergoing an overhaul period at a navy yard adjacent to a large city, in which the interests of enlisted men are more or less scattered and in which there are many prostitutes, clandestine and otherwise, many of whom are presumably already infected. Again, the situation is different during the visit of several ships or an entire fleet to a comparatively small port, such as Newport, R. I. Manifestly it might not be fair to burden the community by permitting as large a number of infected men as there might be at the time among the crews of many ships to go ashore. The situation with ships of the Asiatic Fleet is also different. The mental condition of the infected individual may make it almost imperative that he be given a chance to get ashore occasionally or at comparatively frequent intervals.

So far as the question which has been raised in the past is concerned, that the Navy owes it to the civil community to keep its infected men out of the community, it may be said, and Asst. Surg. Gen. Mark W. White, of the United States Public Health Service, agrees, that the civil community has no right to expect that the Navy shall treat the men attending its clinics—namely, those who are taking treatment on board ship, at naval dispensaries, and in naval hospitals—any differently than the health authorities of the city and State treat the patients attending their clinics. It is perfectly obvious that any attempt to impose restrictions on the movements of men seeking treatment in public health clinics would result in little or no attendance upon the clinic.

Consequently the board believes, and its opinion is expressed below in the language of a proposed general order which it recommends for adoption to supersede General Order No. 69, that no man having venereal disease who has been under regular medical observation and treatment for less than one month from the time the infection was discovered, provided recognized criteria of cure or control of infectivity have not meanwhile been established, should be granted liberty except in case of urgent official or personal necessity, unless in the judgment of the commanding officer the man can be trusted to follow instructions regarding his treatment and the possibility of infecting other persons, or unless in the commanding officer's judgment the probability that the man will menace the health of civilians or of persons belonging to the Navy is not great enough to justify restricting the man to ship or station.

The board believes that any man infected with venereal disease and under treatment for the same, whether or not on the sick list, who having given his word not to engage in sexual intercourse, and who, having been ordered not to do so, disobeys such order while on

liberty granted in accordance with the provisions stated above is deserving of severe punishment.

DEPRIVING MEN OF PAY NOT AN EFFECTIVE MEANS OF PREVENTING VENEREAL DISEASE

The board believes that the law which requires that persons in the Army and Navy shall forfeit all pay while on the sick list with venereal disease resulting from the individual's own misconduct, has, on the whole, operated unfavorably in relation to the prevention and control of venereal diseases in the Navy.

It appears very doubtful whether any considerable number of men have been deterred from sexual intercourse by the knowledge that they would lose pay if they became infected and if by that reason it became necessary for them to be excused from the performance of duty. It is not necessary here to review all the premises leading to that conclusion. To do this it would be necessary to enter into a lengthy consideration of the basic psychological principles involved. Some of these considerations have been referred to briefly above. The primary consideration is the mass of evidence that men have not been prevented from exposing themselves through knowledge of the existence of this law. The law is almost universally regarded as unjust by enlisted men and by many officers.

The worst feature about it is that while knowledge of the law does not prevent exposure it does tend to make men conceal infection when they are situated so that they can do so, and it tends to make them take the risk of developing serious complications and after effects without placing themselves under scientific and prolonged observation now recognized by public health and medical authorities as an essential element of any successful plan for combating the venereal diseases. The law induces many men who are in need of follow-up treatment in persistent cases of gonorrhea and syphilis to deny primary infection and to withhold important information from the medical officer.

In many instances men undergoing treatment for venereal disease have been reported as having no money and no credit to purchase such necessary things as toilet articles. Often dependents suffer severely from being deprived of allotment money while infected individuals are held on the sick list.

The board was informed that the records of the American Social Hygiene Association indicate that the tendency in recent years has been for the railroads and industries of the United States to recognize the desirability of removing the stigma from venereal disease patients as much as possible and of not discriminating between them and employees affected with any other kind of disease so far as medical service provided by the employer is concerned.

The board recommends that such steps as may be practicable be taken, looking to the repeal of the law in so far as it applies to persons belonging to the Navy and disabled as a result of venereally acquired infection.

EDUCATIONAL MEASURES HIGHLY DESIRABLE

As Bishop Freeman has often exclaimed in sermons preached from Bethlehem Chapel of the Washington Cathedral, "You can not make people good by legislation!" On the other hand, the board believes that much in the way of preventing men from exposing themselves to venereal disease is possible through education. General Order No. 69, now in force, contains the following expressions:

"Most men who come into the Navy are young and inexperienced and are therefore to be warned particularly of the dangers to which they will be exposed if they indulge in illicit sexual relations. Emphasis shall be laid upon the moral and physical evils of incontinence. It shall be made clear that continence is not incompatible with health and the fullest degree of physical and mental vigor."

"All men of the Navy shall receive thorough instruction as to the nature and dangers of venereal diseases and they shall be warned that continence is the only sure means of avoiding venereal disease. As much use as possible shall be made of literature, posters, lantern slides, or other material provided by the Bureau of Navigation in cooperation with the Bureau of Medicine and Surgery to supplement instructions given by medical officers."

These instructions are comprehensive and, the board believes, suitable so far as they go. However, the effect of instruction must necessarily depend largely upon the manner in which it is given and very often upon the special ability of the one endeavoring to secure an educational effect to speak convincingly in public or to a small group of men. It is believed that enlisted men of the Navy too often receive but little effective instruction in this connection after leaving a naval training station, for various reasons, including the multiplicity of ship duties, which leaves but little time for the formal instruction of any great part of the crew in such subjects; lack of special aptitude of the medical officer for addressing the crew on the subject of illicit sexual intercourse, with due emphasis upon the moral as well as the possible physical consequences thereof; failure to cultivate a public opinion among the crew that is necessary if the instruction given is to have any great effect; and failure of the commanding officer to recognize the importance of requiring that instruction be given at suitable intervals, and of making such arrangements as will permit the instruction to be given in an effective manner.

The board believes that all recruits should be carefully and thoroughly instructed while at the naval training station at the very beginning of their service in the Navy. While such instruction is now a recognized feature of the course of training at all naval training stations, the board has reason to believe that the instruction given is in some instances too perfunctory in character, and that too much of it is left to hospital corpsmen rather than forcefully executed by a medical officer who has been well selected and suitably trained to make him a convincing instructor. It is believed, too, that the instruction given not infrequently places too much emphasis on the necessity for taking prophylactic treatment as compared with instruction planned to prevent exposure.

The board believes a line should be drawn between the act of exposure and measures subsequently applied to prevent infection. It believes the individual should be regarded as a subject who may profit by good advice and sound instruction until the moment when such advice is no longer capable of preventing disease as indicated by acknowledgment of exposure or request for prophylactic materials. The board recognizes the importance of inducing men to avail themselves of disinfection as promptly as possible in case of exposure, but it believes that no undue emphasis should be laid upon medical prophylaxis in conducting the required instruction relative to the nature and dangers of the venereal diseases.

The board understands that funds are no longer available to purchase or produce posters, pamphlets, moving-picture films, and other materials to supplement instruction given by medical officers as contemplated by General Order No. 69. It appears that through long service, supplies of such materials have been used up and replacements have not been possible during the past year. The board believes that this feature of the campaign against venereal diseases is of sufficient importance to warrant the necessary expenditure of money to carry it on effectively.

The board recommends that appropriate language be used in a general order superseding General Order No. 69 to make it clear that the department expects instruction to be given formally and in a forceful manner to the personnel of all ships and stations at suitable intervals.

The board recommends that there be assigned to each naval training station a medical officer especially qualified to give the required instruction effectively, and that so much of his time as may be required be devoted to the end that all recruits trained at the station will be thoroughly instructed.

The board further recommends that the Bureau of Medicine and Surgery outline the instruction to be given with a view to standardizing, so far as practicable, essential precepts the teaching of which shall be required.

MEDICAL PROPHYLAXIS NECESSARY

The board believes that no matter how well instructed the personnel in general may be, many men will expose themselves, and consequently medical prophylaxis must be enforced. Experience has shown that painstaking efforts to instruct the crews of naval vessels have not sufficed to prevent exposures to any noticeable extent during visits in foreign ports. In the case of one ship, a battleship, during a week's stay in a Mediterranean port, after the most careful endeavors of the commanding officer, the medical officer, and the chaplain, to see to it that all men were thoroughly instructed and informed as to the danger, the records of prophylactic treatments given, when checked against the muster roll of the ship, indicated that more men could hardly have been expected to expose themselves if no instruction had been given.

With regard to men serving ashore in foreign countries as well as the personnel of ships visiting foreign ports, the board believes that without compulsory disinfection after exposure there would be at best a great many cases of venereal disease which could have been prevented by prophylactic treatment promptly and properly administered. In somewhat less degree this statement is true for men granted liberty in domestic ports.

From the evidence before it the board believes that many men will for various reasons avoid prophylaxis unless compelled to report exposure and submit to disinfection. General Order No. 29 of January 5, 1921, later superseded by General Order No. 69 of September 16, 1921, required that all men upon returning to their ships or stations should be given opportunity to report voluntarily at the dispensary exposure to possible infection without delay and that those so reporting should receive prophylactic treatment. The order also required that suitable records of treatments administered should be kept, and that, when proper instructions had been given, failure to report for prophylactic treatment should be regarded as cause for disciplinary action for disobedience of orders, and that men developing venereal disease who had not reported exposure promptly upon returning to ship or station should be reported to the commanding officer in every instance.

According to the provisions of General Order No. 69, prophylaxis is purely voluntary unless the commanding officer or a force or fleet commander chooses to issue an order making the reporting of exposure and submission to disinfection compulsory within his jurisdiction. This has been done in the Asiatic Fleet and in certain other forces.

In touching upon this point the Surgeon General of the Navy, in his Annual Report for 1924, remarked, "Experience indicates

that, by and large, prophylaxis is not sought by the men and that it will be neglected more often than not unless they are compelled to report for treatment after having exposed themselves to possible infection. This measure of prevention therefore can not be applied with hope for uniform success without disciplinary action in cases where failure to submit to disinfection can be proved. The success of this measure therefore depends in part upon varying attitudes of commanding officers."

Again, in alluding to General Order No. 29, the Surgeon General states that there was altogether too much variation in the manner in which it was carried out. He wrote, "So far as the bureau could judge, in many instances men were not punished for failure to report exposure and submit to disinfection in cases where failure could be proved, and there was a good deal of variation in the nature of the punishment awarded."

The board recommends that the following language be incorporated in a general order to supersede General Order No. 69:

All men of the Navy shall be informed that failure to report exposure to possible venereal disease through illicit sexual intercourse as promptly as the circumstances permit, and failure to take prophylactic treatment as prescribed by the medical officer constitutes a violation of this general order. Wherever prophylactic treatment is administered a loose-leaf daily record shall be kept, showing the names of men reporting exposure, the date of exposure, name of the port or other place, the time in hours and minutes elapsing between exposure and prophylactic treatment, and, if administered ashore, the names of the organization to which the men are attached. Each day the record for the preceding 24 hours shall be signed by the hospital corpsman supervising the treatment, removed from the treatment room, and marked so that names can not subsequently be entered. Such records shall be regarded as confidential and shall not be kept permanently but shall be destroyed as soon as they have served statistical and other purposes.

In every instance of venereally acquired infection, when the established facts support the conclusion that the man did not promptly report exposure and take prophylactic treatment under supervision, the man shall be reported to the commanding officer for disobedience of this order. The department considers that this offense is of such a nature as to warrant trial by summary court-martial.

The board considers that the form of prophylaxis and methods of administering treatment are matters which properly come within the province of the chief of the Bureau of Medicine and Surgery, and it has no suggestions to make regarding them. It understands that the Bureau of Medicine and Surgery has devoted much time and thought to the experimental development of prophylactic mate-

rials of increased preventive value in order that better protection against infection with syphilis may be afforded those who wish to avail themselves of prophylaxis promptly after exposure. The board feels that syphilis is so dangerous a disease that every practicable effort should be made to induce men not to neglect the prompt application of the prophylactic agents made available by the Bureau of Medicine and Surgery invariably in case of exposure.

PROMOTION OF SOCIAL OPPORTUNITIES FOR MEN ON LIBERTY VERY IMPORTANT

The board feels that much can be done to prevent men of the Navy from becoming infected with venereal disease by more direct efforts on the part of the Navy Department than have been made in the past to promote acquaintanceship between enlisted men of the Navy and young women of good character in the various communities visited by naval personnel.

It believes that many dangerous contacts, at least in cities of the United States, would be avoided if enlisted men of the Navy had approximately the same opportunity that young men in civil life have for companionship with the opposite sex. Men attached to shore stations such as navy yards, those on recruiting duty, etc., and even the crews of ships having fixed home ports, do have such opportunity in varying degree, and it is significant that venereal disease admission rates for such groups of naval personnel are comparatively low and in some instances very low indeed.

Certain considerations based on knowledge of human nature as well as the statistics examined by the board lead to the conclusion that all service conditions which discourage marriage or tend to prevent men from being in any one community long enough or often enough to make desirable friendships in the community, which can be resumed at regular intervals, have an adverse effect upon venereal-disease expectancy. From the standpoint of venereal-disease prevention it would be very helpful if home ports for the force afloat could remain unchanged, so that married men could establish their families there, and all men could feel that they had a permanent base to which they could regularly return at frequent intervals.

Without opportunities for the men to form associations and enduring friendships with young women of good moral character the venereal-disease problem must to that extent be more difficult to solve. Transfers to other stations and change of home port from one navy yard to another require that new associations be formed, and associations with immoral women in the strange community are formed much more readily and rapidly than among respectable families.

The board gave careful consideration to the following paragraphs in the Report of the Surgeon General of the Navy for 1924:

"The Navy can not ignore the chief issue concerned and hope to attain success in protecting its health. The whole question hinges on human nature and the fact that the men must have or will have the companionship of women. The thoughts of the men quite constantly turn to women. While with some the principal object almost invariably associated with liberty may be to find a prostitute, in the minds of many or most of the men the uppermost idea is the desire or longing for the companionship of a young woman or girl who is socially and intellectually compatible. When he can become acquainted with moral or ostensibly virtuous women of this sort, the bluejacket is ordinarily content and will behave himself—at least he will less frequently seek women of the other type with a consequent reduction in the rate of exposure to infection. The Navy's need in this respect is already recognized by certain churches and unofficial organizations in cities adjacent to navy yards and naval bases. In some instances well-informed women, suitably trained, are employed at good salaries to act as hostesses and direct the work of providing entertainment of a proper character for the men on liberty. Places are provided where they can meet young women of the right sort under proper conditions, and dances and other entertainments are given at frequent intervals. In a limited way excellent results have attended such efforts, but, if possible, the Navy should take the lead in such work and then look to outside agencies for cooperation. It is believed that steps should be taken to secure the services of a certain number of well-qualified women, preferably college graduates with thorough training in sociological work, as full-time and well-paid employees. A woman of this type at a naval base or port in which large numbers of the enlisted men are regularly or frequently granted liberty could accomplish a great deal, acting as hostess, perhaps, under certain conditions, but in a larger way by acting as a link between the naval authorities seeking the cooperation of the women of the community and making the cooperation of organizations already interested more effective. Indirectly, the activities of a well-trained woman of this character could well be expected to lead also to a better understanding with the local authorities, including the police department and courts.

"There are plenty of young women who would make desirable friends for the men in all our cities and who would be glad to become acquainted with them under proper conditions and participate in dances and other approved forms of diversion enjoyed by both sexes. The promotion of such relationships is an important objective in any plan calculated to control venereal disease in the Navy. The men do become acquainted quite generally in fixed

home ports, and the beneficial result is illustrated by the visits of ships of the battle fleet at New York this year. Nearly all the ships that went there returned very high admission rates for venereal disease as the result of the visit. When the U. S. S. *Arkansas*, U. S. S. *Wyoming*, and other vessels which have New York as their home port returned after spending the winter in southern waters they did not experience more than the expected number of admissions. The members of their crews for the most part had many acquaintances and girl friends it may safely be presumed."

The opinions and ideas of representative men and women were sought with a view to determining the practicability of carrying out the suggestions contained in the paragraphs quoted above, and of determining what activities would be likely to accomplish desired results and to what extent cooperation might be secured among men and women in communities where it might prove advisable to demonstrate the feasibility of providing desirable social contacts and entertainment for enlisted men of the Navy.

The board found that the mere suggestion that the Navy Department was considering the advisability of promoting cooperation with civil agencies to improve the conditions surrounding its enlisted men while on liberty at once aroused great interest and brought forth assurances of substantial aid from such organizations as the American Social Hygiene Association, the Girl Scouts of America, the Bureau of Social Hygiene, New York City, the Playground and Recreation Association of America, and the National Congress of Parents and Teachers.

There was general agreement among those who conferred with the board that ample cooperation and assistance could be obtained from leading women and women's organizations in practically all cities near navy yards and naval bases to make the undertaking a success if the Navy would take the lead by seeking cooperation and by sending a woman of suitable attainments into the community to promote cooperation and to assist in organizing community resources to the desired end.

The women present at the conference agreed that young women of good character who would make desirable friends for men of the Navy and who would be glad to become acquainted with them under proper conditions were numerous enough in at least the larger cities to make organized efforts to bring about such meetings worth while. The likelihood that unfortunate results would follow in some cases was not regarded as a contraindication. This consideration was dismissed with the statement that contacts for young women among men of the community could not be guaranteed 100 per cent safe.

SUGGESTED PLANS FOR SOCIOLOGICAL WORK

Miss Winifred Callahan, of the Women's Protective Association of Cleveland, Ohio, who has studied conditions surrounding certain naval stations, submitted by letter the following suggestions relative to possible activities of a trained woman serving as a full-time employee under the direction of the commandant of a naval district or base:

Objectives

I. To present clearly to the commandant of a naval station, and to the community or communities adjacent to the station, a practical, constructive program for protective social measures.

II. To endeavor to secure within the naval station such cooperation as would be helpful toward the successful carrying on of such a program.

III. To awaken interest and responsibility in the civic consciences of the community or communities adjacent to the naval station to the extent that they will support an effort to operate effectively a program of protective social measures.

IV. To foster the spirit of helpful cooperation between the Navy personnel and the civilian populace that they might better meet the problems of morals and health that arise in a locality geographically common to both.

Suggested program for protective social measures practical for operation through a trained woman attached to the office of the commandant of a naval station

1. Informational measures:

(a) Most important is the acquiring of broad information concerning the existence in the community near the naval station of sources responsible for the spread of venereal disease.

(1) Girls and women—

The causes of venereal diseases are most deeply embedded in social instincts. The morals and health of Navy personnel are influenced chiefly by the character and health of the girls and women with whom they associate and the general conditions existing in the locality where such associations are formed.

Because girls and women play such an important rôle in the moral and physical welfare of the man in the Navy it follows that sexual promiscuity and venereal diseases are tremendously influenced through the presence of delinquent, predelinquent, and feeble-minded girls and women in the vicinity of a naval station.

Therefore, according to the extent to which the above-mentioned types of girls and women are brought to the notice of a worker devoted to such an undertaking—who could refer them to the proper agencies for medical, legal, or social treatment—to a proportionate extent can safety to the health of Navy men be increased.

Valuable sources of information concerning such girls are available through cooperating with the following:

Medical officers of the Navy.

Chaplains of the Navy.

Intelligence officers.

Administrative officers.

Enlisted Navy personnel.

Police department.

Welfare agencies such as Red Cross, attached to or cooperating with the naval station.

Cooperating social, civic, and legal agencies in the adjacent community.

Through the contacts made with the girls and women the following would result:

Information secured conducive not only to the protection, rehabilitation, and readjustment of the individual but for the protection of the community and the Navy.

Information secured concerning community conditions that lead to delinquency and the spread of venereal diseases.

Information secured disclosing inadequate enforcement of laws and ordinances, or a need for new laws and ordinances or a revision of the old ones.

Information secured furnishing facts upon which the Navy and the community might arrive at a more nearly accurate judgment of the causes of delinquency and prostitution and the effects of the same upon naval personnel.

Such information effective in providing suggestions for remedial sources of procedure.

(b) Distributing, with the approval of the commandant, of such information as might work for the protection of the Navy and the community. (Social organizations, the press, the platform, conference with law-making and law-enforcing officials, and reliable social agencies.)

2. Safeguarding measures:

(a) Secure and maintain clean, safe, and wholesome commercial and noncommercial amusements, recreations, play, and entertainment. (Cooperation of community forces, for regulation, legislation, and inspection.)

(b) Safeguard transportation facilities, public thoroughfares, and social groups. (Community forces cooperating.)

(e) Preventive measures—

(1) Encourage in every way possible enforcement of city ordinances against offending dance halls, hotels, rooming houses, taxicabs, street walkers, etc.

(2) Encourage enforcement of State laws against prostitutes, panderers, etc.

(3) Encourage enforcement of Federal laws against interstate traffic in women.

(4) Secure detention, isolation, quarantine, and if necessary the commitment of women carriers.

(5) Enlist the aid of every resource possible in the community that might tend to prevent girls from becoming sex delinquents.

(d) Remedial and restorative measures (to be applied to girls and women influencing the health standards of naval personnel)—

(1) Medical treatment—

(a) Secure provision for proper medical treatment and hospitalization for venereally infected girls and women. If the community does not afford facilities for the same, endeavor to inculcate a proper appreciation of the obligation for providing them.

(2) Legal treatment—

(a) Close cooperation with all courts, especially the juvenile court.

Resort to legal treatment for infected girls and women to be had only when all other social welfare procedures seem unwise or impossible.

(3) Social treatment (girls and women)—

(a) Physical examination.

(b) Mental examination.

(c) Establish good living conditions as to food and lodging.

(d) Secure placement in school or at work.

(e) Provide for wholesome recreation.

(f) Encourage religious practices within the individual's affiliations and a desire for cultural pursuits.

The following results favorable to the welfare of naval personnel might reasonably be expected from carrying out the above program:

1. A decrease in venereal diseases among men of the Navy.
2. The inculcating, to a certain degree, of ideals of moral self-control.
3. Securing the enactment of social laws and ordinances.
4. Decreasing commercialized vice.

5. Preventing delinquency among juvenile girls.
6. Favorable constructive results obtained from high-class social case work with delinquent girls and women.
7. Change in public opinion regarding venereal disease.

In inaugurating and pursuing the above program the following might be considered:

1. That all contacts made with communities of the general public, by a trained woman attached to the office of the commandant of a naval station, should be done so with his sanction after he has reviewed the subject to be presented, as well as to whom and in what manner to be presented.

2. That, in the opinion of the writer, as much if not greater damage to the moral and physical welfare of the men in the Navy comes from their promiscuity with delinquent girls of tender years, whose associations with them are not for commercial purposes. Conceding this to be true, the situation calls for the most skillful type of preventive and correctional work with girls, the same to be approached from a constructive social point of view.

3. That all matters pertaining to the personal affairs of Navy men and girls must be treated with the utmost confidence and kindness and references to them made only with the greatest discretion, even when such personal affairs are being brought to the attention of individuals or groups legitimately authorized to deal with corrective and constructive methods.

Dr. Valeria Parker of the American Social Hygiene Association, in the light of her experience as executive secretary of the United States Interdepartmental Social Hygiene Board, presented the following tentative outline of a plan which might be followed in the beginning by a community worker employed by the Navy:

- I. Survey of port cities and naval centers.
 - A. Girls frequenting naval district.
 - B. Recreational agencies.
 - C. Sailor problems as viewed by community agencies.
 1. Voluntary.
 2. Official.
 - D. Community resources for cooperative program.
 - E. Facilities for venereal disease treatment.
 1. Sailors.
 2. Girls.
 - F. Venereal disease statistics of United States Navy in relation to localities of infection on "shore leave."
- II. Demonstration program in one or more port cities or naval centers to test the practicability of the program.
- III. Secure the appointment of a social worker or other qualified person in each community to take charge of the program.

IV. Community agencies of possible assistance in program:

Patriotic and civic welfare organizations, including Rotary, Kiwanis, churches, Young Men's Christian Association, Young Women's Christian Association, Federation of Women's Clubs, chambers of commerce, Daughters of American Revolution, parent teachers' associations, Woman's Christian Temperance Union, Gold Star Mothers, Women's Relief Corps, Girl Scouts, business and professional women's clubs, playground and recreational associations.

Individuals interested in protective program for young men of the United States Navy.

V. Possible committee activities:

Provide rooming lists (after investigation).

Provide amusement lists.

Provide club entertainment (large cities).

List persons willing to entertain house guests.

List persons willing to give special dinners.

Provide special entertainments in honor of sailors, such as drives, dances, etc.

Provide hut for reading, smoking, receiving women friends.

Secure cooperation of mayor, city officials, and police.

Establishment of women's bureaus in police departments of larger towns and cities whenever possible.

Secure supervision and licensing of public amusement places.

VI. Under-cover investigation:

This should be made in every community visited by the United States Navy. (Possible cooperation of American Social Hygiene Association.) With this report as a basis, special agent should attempt to secure the cooperation of local officials in a "clean-up" of bootleggers and prostitutes preying upon the sailors. A check-up investigation should be made six months later.

VII. Cooperation with naval authorities:

Under the authority of the United States Navy the worker should endeavor to secure the active cooperation of commanding officers, chaplains, and surgeons in the successful carrying out of a constructive "shore leave" program.

EMPLOYMENT OF TRAINED SOCIAL WORKERS RECOMMENDED

The board recommends, with a view to the gradual development of cooperative social activities under the direction of the Navy Department, that a woman of suitable character and training, experienced in sociological work and of agreeable and forceful personality, be employed in the Bureau of Navigation, at whatever salary may be necessary to secure the services contemplated, to assist in studying the social problems involved in the several naval districts and prin-

cial communities thereof, for the purpose of formulating practical plans for placing in the field other women of suitable qualifications to work under the direction of the respective commandants of naval districts or of naval stations in all communities regularly or frequently visited by naval personnel in sufficient numbers to justify carrying on such activities.

From the comments made by the men and women with whom conferences were held the board is convinced that the adoption of the plan as proposed would so strengthen the confidence of the parents of the Nation in the earnest desire of the Navy to promote the health and welfare of its men and foster correct ethical, moral, and social habits that the benefits accruing would by no means be limited to the prevention of disease. The initiation of such a plan would seem to be justified from the recruiting standpoint, as well as naval efficiency in general, on account of increased willingness of parents to have their sons enlist in the Navy.

SUMMARY OF THE BOARD'S RECOMMENDATIONS

In concluding this report the board makes the following specific recommendations:

(1) That such steps as may be practicable be taken looking to the repeal of the law which requires that persons in the Army and Navy shall forfeit pay while on the sick list with venereal disease resulting from the individual's own misconduct in so far as it applies to persons belonging to the Navy.

(2) That there be assigned to each naval training station a medical officer especially qualified to give instruction regarding venereal diseases in an effective manner, and that so much of his time be devoted to this duty as may be required to insure that all recruits will be thoroughly instructed before leaving the station.

(3) That the Bureau of Medicine and Surgery outline the instruction to be given regarding venereal diseases, with a view to standardizing, so far as practicable, essential precepts the teaching of which shall be required.

(4) That a woman of suitable character and training, experienced in sociological work, and of agreeable and forceful personality, be employed in the Bureau of Navigation, at whatever salary may be necessary to secure the services contemplated, to assist in studying the social problems involved in the several naval districts and principal communities thereof for the purpose of formulating practical plans for placing in the field other women of suitable qualifications to work under the direction of the respective commandants of naval districts or of naval personnel in all communities regularly or frequently visited by naval personnel in sufficient numbers to justify carrying on such activities.

(5) That the following paragraphs, which include certain other recommendations, be adopted and published to the naval service as a general order to supersede General Order No. 69:

Measures for the prevention and control of venereal diseases

1. General Order No. 69, dated September 16, 1921, is hereby superseded and canceled.

2. Most men who come into the Navy are young and inexperienced and are therefore to be warned particularly of the dangers to which they will be exposed if they indulge in illicit sexual relations. The department directs that instruction be given formally and in a forceful manner to the personnel of all ships and stations at suitable intervals. Emphasis shall be laid upon the moral and physical evils of incontinence. It shall be made clear that continence is not incompatible with health and the fullest degree of physical and mental vigor.

3. Thorough instruction shall be given as to the nature and dangers of venereal diseases. As much use as possible shall be made of literature, posters, lantern slides, or other material provided by the Bureau of Navigation in cooperation with the Bureau of Medicine and Surgery to supplement instruction given by medical officers.

4. All men shall be informed that failure to report exposure to possible venereal disease through illicit sexual intercourse, as promptly as the circumstances permit, and failure to take prophylactic treatment as prescribed by the medical officer, constitutes a violation of this general order.

5. Proper facilities shall be provided for the prompt examination and treatment of men who have acquired a venereal disease or who have been exposed to infection. Where practicable, when large liberty parties are sent ashore, or when other conditions are such as to make it advisable, proper facilities for giving prophylactic treatment shall be provided in a suitable place ashore.

6. Wherever prophylactic treatment is administered, a loose-leaf daily record shall be kept, showing the names of men reporting exposure; the date of exposure; the name of the port or other place; the time in hours and minutes elapsing between exposure and prophylactic treatment; and, if administered ashore, the names of the organizations to which the men are attached. Each day the record for the preceding 24 hours shall be signed by the hospital corpsman supervising the treatment, removed from the treatment room, and marked so that names can not subsequently be entered.

7. Every case of venereal infection, regardless of the degree of disability involved, shall be made a matter of statistical record.

8. No man having venereal disease who has been under regular medical observation and treatment for less than one month from the

time infection was discovered, provided recognized criteria of cure or control of infectivity have not meanwhile been established, shall be granted liberty except in case of urgent official or personal necessity; unless, in the judgment of the commanding officer, the man can be trusted to follow instructions regarding his treatment and the possibility of infecting other persons, or unless in the commanding officer's judgment the probability that the man will menace the health of civilians or of persons belonging to the Navy is not great enough to justify restricting the man to ship or station.

9. In every case of venereally acquired infection, when the established facts support the conclusion that the man did not promptly report exposure and take prophylactic treatment, under supervision, the man shall be reported to his commanding officer for disobedience of this order. The department considers that this offense is of such a nature as to warrant trial by summary court-martial.

10. Commanders in chief, division commanders, commandants, and other officers charged with the inspection of individual organizations shall include in their inspection reports a statement as to the manner in which this order is being enforced.

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ADMISSIONS FOR INJURIES AND POISONING, JUNE, 1925

The following table, indicating the frequency of occurrence of accidental injuries and poisonings in the Navy during June, 1925, is based upon reports reaching the bureau prior to September 10, 1925:

	Admissions, June, 1925	Admission rate per 100,000 per annum, June, 1925	Admission rate per 100,000, year 1924
INJURIES			
Connected with work or drill.....	394	4, 119	3, 148
Occurring within command but not associated with work.....	213	2, 227	1, 706
Incurred on leave or liberty, or while absent without leave.....	124	1, 296	1, 004
All injuries.....	731	7, 643	5, 857
POISONING			
Industrial poisoning.....	2	21	21
Occurring within command but not connected with work.....	7	73	128
Associated with leave, liberty, or absence without leave.....	0	0	26
Poisoning, all forms.....	9	94	175
Total, injuries and poisoning.....	740	7, 737	6, 032

PERCENTAGE RELATIONSHIPS

	Occurring within command				Occurring outside command	
	Connected with the performance of work, drill, etc.		Not connected with work or prescribed duty		Leave liberty, or A. W. O. L.	
	June, 1925	Year, 1924	June, 1925	Year, 1924	June, 1925	Year, 1924
Per cent of all injuries.....	53.9	53.7	29.1	29.1	17.0	17.2
Per cent of poisonings.....	22.2	12.1	77.8	73.4	0	14.5
Per cent of total admissions, injury and poisoning titles.....	53.5	52.5	29.7	30.4	16.8	17.1

Poisoning by a narcotic drug or by ethyl alcohol is recorded under the title "Drug addiction" or "Alcoholism," as the case may be. Such cases are not included in the above figures.

The following cases selected from June reports are worthy of notice from the standpoint of accident prevention:

Absence of guard rail leading to fall through an open hatch.—The accident happened in the dark on board a battleship.

Insecure staging.—A man was repairing a ventilator cowl. The staging rigged for the work rested upon a cleat attached to the smokestack. The cleat gave way. The man fell about 20 feet, struck on the back of his head, and sustained a fracture of the skull.

Careless handling of gasoline.—A leaking hose was used to fill the gasoline tank of a motor boat from the storage tank on board ship. Gasoline leaked about the motor and into the bilges. When the engine was started a spark ignited the vapor and an explosion followed. Two men received burns of the face and hands. Eleven sick days were recorded in each case.

Unsafe practice.—A marine was riding on the tongue of a trailer attached to a truck with rope. The rope carried away. The man was thrown to the ground. The trailer ran over him and killed him.

Defective rope.—A man was painting a smokestack. The rope used to support him was old and worn. It parted and the man fell to the deck, sustaining a dislocation of a shoulder for which he was treated on the sick list for 45 days.

Unguarded clutch in motor sailer.—The cover had been left off the clutch. A man upon getting into the crowded boat at night caught his foot in the clutch and received multiple contusions.

Defective thwart in motor sailer.—The thwart which was reported as defective from use, broke, throwing the occupants to the bottom of the boat. One man sustained a fracture of the foot. Thirty-one sick days were recorded.

Slippery ladder on a battleship.—There was oil on a ship's ladder. A man slipped and fell through four decks, landing on the steel deck below. Multiple contusions.

Lack of protective goggles.—A man not provided with goggles received a chemical burn of both eyes caused by benzyl acetate while painting airplane fabric with "dope."

Defective catch on hatch cover.—The catch was reported as defective from use. The hatch cover fell on a man's hand while he was descending the ladder. A contusion of the wrist required 10 days' treatment on the sick list.

Hole in engine-room floor.—On board a transport an engine-room floor plate which had been removed during working hours was not replaced. During the night a man fell into the engine-room bilge as he stepped from the fire room into the engine room. He was treated on the sick list for three days for a lacerated wound of the head.

Preventable flare-back in the fireroom of a destroyer.—The smoke-stack cover had not been removed. A flareback occurred when the boiler was lit off. Burns of the neck, arm, and hand resulted in the loss of 15 days.

Hot tar left in an unauthorized place.—A pot of hot tar was left on the deck of a battleship in an unsafe place. In the dark a man stepped in it and received a burn of the leg which kept him on the sick list for 28 days.

Improper storage of phosphorus.—Fuel oil had been allowed to accumulate on the water in a bucket in which phosphorus was kept. A man reached in to remove a piece of phosphorus. A severe burn of the hand resulted.

HEALTH OF THE NAVY

This report is for the month of October. Good health conditions prevailed during the summer and continued throughout October. The general admission rate for the whole Navy, provisionally determined, was about the same as for the corresponding month last year—525 per 1,000 per annum, a rate which is considerably lower than for most previous years.

Monthly summaries of health conditions among forces afloat are based upon morbidity reports for the month to which the summary relates, which are received before the 15th day of the following month. October reports were received in time for use from only 81 per cent of the vessels comprising the Battle Fleet and from 80 per cent of the Scouting Fleet. Admissions for communicable diseases of the respiratory type appear to have been notably less numerous than expected. This is true of colds, acute tonsillitis, acute bronchitis, and influenza, as well as of the less common diseases. Only six cases of influenza were notified by all ships exclusive of those on the Asiatic Station.

The common respiratory diseases were reported in greater numbers by naval stations in the United States, but the incidence was not unduly great considering climate, geographical location, and prevalence of disease in the environment. Reports were received from all but two small stations. These represented a combined strength of 24,893. The totals for certain communicable diseases were influenza, 30, ten of which were reported by the naval air station, San Diego, Calif.; pneumonia, 2 cases, both occurring at the marine barracks, Quantico, Va., where one case of scarlet fever also occurred. Only three cases of mumps were reported during the month, and no case of measles or cerebrospinal fever.

The following table shows provisional admission rates per 1,000 per annum, entire Navy, for the principal communicable diseases for August, 1925, together with corresponding median rates for the same month, 1920 to 1924, inclusive:

	August, 1920-1924	August, 1925
Cerebrospinal fever.....	0	0. 42
Diphtheria.....	. 31	0
German measles.....	. 50	. 32
Influenza.....	9. 18	13. 77
Malaria.....	25. 72	6. 57
Measles.....	2. 83	1. 38
Mumps.....	4. 01	2. 44
Pneumonia.....	3. 03	2. 86
Scarlet fever.....	. 58	. 11
Smallpox.....	0	0
Tuberculosis.....	2. 32	2. 22
Typhoid fever.....	0	0

TABLE NO. 1.—*Summary of morbidity in the United States Navy and Marine Corps for the month of August, 1925*

	Forces afloat	Forces ashore	Marine Corps	Entire Navy
Average strength.....	74, 979	38, 332	19, 306	113, 311
All causes:				
Number of admissions.....	2, 942	1, 867	875	4, 800
Annual rate per 1,000.....	470. 84	584. 46	543. 81	509. 27
Disease only:				
Number of admissions.....	2, 630	1, 625	770	4, 255
Annual rate per 1,000.....	420. 91	508. 71	478. 55	450. 66
Communicable diseases, exclusive of venereal disease:				
Number of admissions.....	695	466	188	1, 161
Annual rate per 1,000.....	111. 23	145. 88	116. 84	122. 95
Venereal diseases:				
Number of admissions.....	1, 060	279	183	1, 369
Annual rate per 1,000.....	174. 44	87. 34	113. 73	144. 96
Injuries:				
Number of admissions.....	309	241	105	550
Annual rate per 1,000.....	49. 45	75. 45	65. 26	58. 25
Poisoning:				
Number of admissions.....	3	1	0	4
Annual rate per 1,000.....	. 48	. 31	0	. 42

TABLE No. 2.—Deaths reported, entire Navy, for the month of October, 1925

	Navy (strength, 74,979)	Marine Corps (strength, 19,308)	Total (strength, 113,311)
Cerebrospinal fever.....	1	0	1
Malaria.....	0	1	1
Scarlet fever.....	1	0	1
Pneumonia, lobar.....	1	0	1
Tuberculosis, chronic pulmonary.....	2	1	3
Malignant growths.....	1	0	1
Other diseases.....	11	2	13
Drowning.....	33	1	34
Other accidents and injuries.....	9	0	9
Poisoning.....	1	0	1
Total.....	60	5	65
Annual death rate per 1,000, all causes.....	7.66	3.11	6.88
Annual death rate per 1,000 disease only.....	2.17	2.49	2.22

Twenty-seven of the deaths from drowning were connected with the loss of the U. S. S. S-51, Sept. 25, 1925.

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